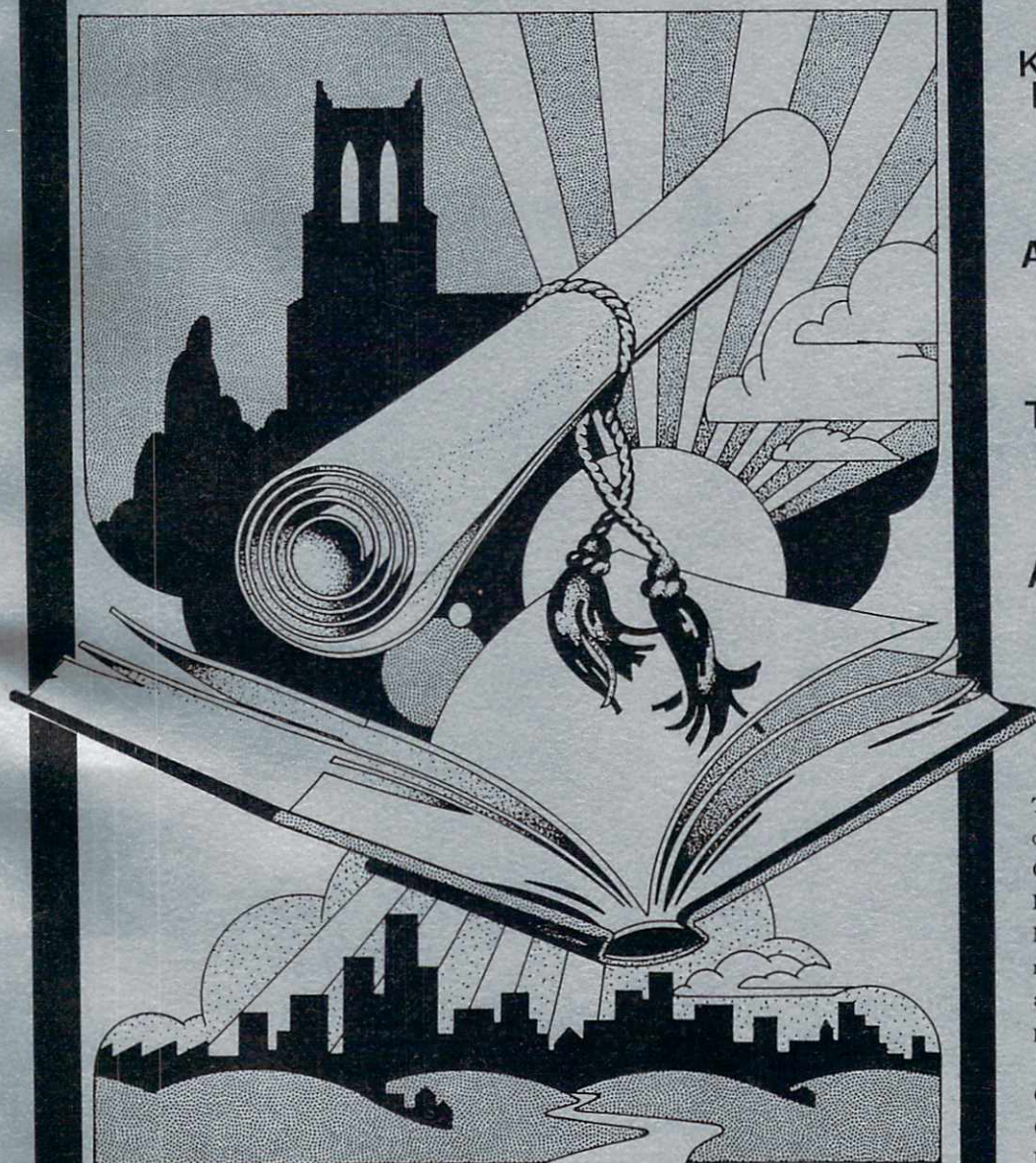


COMAL TODAY

Index to COMAL Today Issues 1 Through 12
by Kevin Quiggle



56 Pages --- 4,848 Entries

THE INDEX

How to Use
This Index
page 1

Keywords and
Phrases
page 2

Authors
page 38

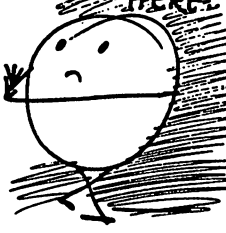

Titles
page 42

Appendix
page 49

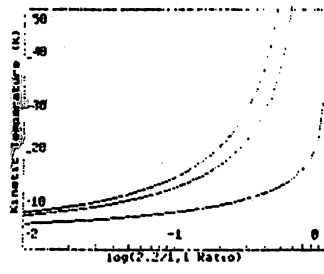
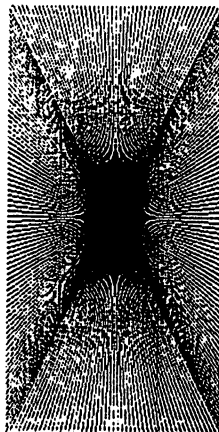
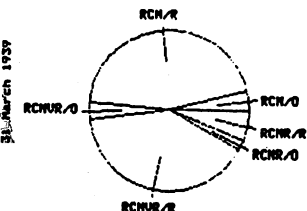
This book and accompanying disk is copyright 1986 by COMAL Users Group, U.S.A., Limited. All rights reserved. No part of this book may be reproduced in any way or by any means without written permission from the publisher.

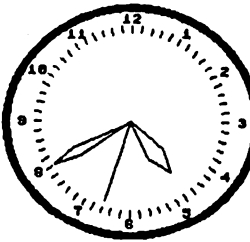

Captain COMAL is trademark of COMAL Users Group, U.S.A., Limited.

Printed in the U.S.A.

<p>OH - NO BASIC HERE...</p> 	<p>COMAL IS A 10</p> <p>10</p> <p>CELEBRATING COMAL'S 10TH ANNIVERSARY</p>
<p>COMAL IS NUMBER 1</p> <p>1</p> <p>ISSUE NUMBER 1</p> <p>COMAL TODAY</p> <p>JAN/FEB 1984</p>	<p>BE HAPPY WITH</p>  <p>CAPTAIN COMAL</p>

<p>CELEBRATING COMAL'S 10TH ANNIVERSARY</p>	<p>COMAL TODAY</p>
<p>CAPTAIN COMAL TRAVELS AROUND THE UNIVERSE...</p>  <p>-will you buy a ticket?</p>	<p>2</p>

 <p>Graphics Dump - Figure 1 - see page 31</p>	<p>COMAL TODAY</p> <p>3</p> <p>CELEBRATING COMAL'S 10TH ANNIVERSARY</p>
<p>I SPEAK COMAL</p>	 <p>Graphics Dump - see page 41</p>
<p>ROYAL CANADIAN NAVY</p>  <p>Q - officers, R - ratings, 2947 total</p> <p>Graphics Dump - Figure 2 - see page 31</p>	

<p>WALL CLOCK - SEE PAGE 29</p> 	<p>COMAL TODAY</p> <p>4</p> <p>CELEBRATING COMAL'S 10TH ANNIVERSARY</p>
<p>A FIRST LOOK AT THE COMAL 2.0 CARTRIDGE</p> <p>IMPROVED COMAL 0.14 MEMORY MAP</p> <p>ERROR MESSAGES BUILT INTO COMAL 0.14</p> <p>GRAPHIC SCREEN DUMPS</p> <p>GUTENBERG FANCY FONTS</p> <p>SOUND AND MUSIC</p> <p>NAME TABLE DETAILS</p> <p>PROTECTOR</p> <p>DYNAMIC DATA CREATION</p> <p>AUTOMATIC FILE LISTING PRINTER</p> <p>TWO DRIVE COPIER</p> <p>HOW CAN I FORGET THESE?</p>	<p>SMALL AND BIG PROGRAMMES</p> 

How To Use This Index

by Kevin Quiggle

This index covers the first 12 issues of *COMAL Today*. There are three separate listings: keywords and phrases, authors, and titles. Since each of the three listings serves a different function, each has a slightly different form. However, each section shares a common form of citation.

The citation for each index entry refers to both a volume (issue) number and a page number, in the form V#-P#, where V# is the volume number and P# is the page number. For example, in the keywords part of the index you will find this entry:

data base program 8-25,11-72

This means that information on data base programs will be found in *COMAL Today* #8 on page 25, and in *COMAL Today* #11 on page 72. Aside from that, there are some important variations in the three listings which I will now explain.

KEYWORDS AND PHRASES

This is the most useful of the three sections. The entries are keywords, phrases, program names, function names, and so on. Entries in this listing have been cross-indexed; this means that a single topic may be cited in several different places in the index. For example, the entry:

sieve of Eratosthenes benchmark

is also found under both:

benchmark, sieve of Eratosthenes

Eratosthenes benchmark, sieve of

In addition, there are numerous suggestions throughout the keywords listing to check related topics. If you look up *procedure* for example, you will find (along with 72 other entries):

procedure: see also algorithm, emulation,
function, program, routine,
simulation

AUTHORS

All articles written by a particular author are cited; however, unlike the keywords listing, the cites have not been *compressed*. If an author has written five articles, his or her name will appear five times. This was done to show more clearly which issues of *COMAL Today* an author has appeared in, and how many articles that author has contributed. Multiple listings for a single author are listed in order of both issue and page number. A few spelling variations (for example Mac and Mc) have been cross referenced in this listing.

TITLES

As the heading indicates, this listing is simply all the article titles which have appeared in *COMAL Today* issues 1 thru 12. Entries in this listing are not cross indexed.

STATISTICS

Everybody seems to like statistics, so here is a brief rundown of what you will find in this index:

3,797 keywords and phrases entries
381 author entries
670 title entries
<hr/>
4,848 total entries

Have fun, and happy referencing!

Keywords and Phrases

0.14 list file into 1.02 bug 2-33
0.14/2.0 WRITE file incompatibility, COMAL 7-51
1.02, COMAL version 2-30
1063 COMAL programs, list of 5-11
1520 plotter driver procedures 7-62
1520 plotter graphics screen-dump 5-51
1520 plotter, LIST to 3-35,10-29
1520 plotter print'screen procedure 5-51
1520 plotter procedures 9-48
1520 plotter, three dimensional fractals on 12-26
1525 graphics dump 9-78
1525 printer, LIST to 3-35
1541 disk drive alignment 7-55
1541 disk drive, examining memory in the 7-59
1541 drive alignment program 9-34
1541 drive mode, switch 1571 to 12-77
1541 drive speedup, RABBIT package 12-5
1541 drives, copy files with two 10-71
1541 drives, copy with two 4-18
1541 Express drive speed up cartridge 4-17
1541 FLASH, Skyles 6-43
1541 FLASH 5-39
1571 as dual drive 12-77
1571 to 1541 drive mode, switch 12-77
32 character limit, function key 7-77
3d'fractals program 12-26
40 sprites on screen, show 12-65
80 column character set 7-54
80 column screen, C128 11-26
80 column screens and COMAL 11-75
80 column video chip, C128 12-3
8023P printer control program 2-29
8023P'OPTIONS program 2-29
8096 COMAL 2.0 7-11
abbreviation, PRINT 1-22
abbreviations in COMAL 2-23
access, COMAL 2.0 file 6-14
access from COMAL 2.0, character ROM 6-37
Access Software SPRITE MASTER 8-46
accessing error messages in COMAL 0.14 7-50
accessing printer secondary address 6-49
accessing RAM under I/O and character generator 3-43
accessing sprite memory in COMAL 2.0 6-41
accessing user errors 3-7
ACE, COMAL 10-2
Ackermann function 8-41
ACORN computer 1-2
Acorn Electron 11-10
Acornsoft COMAL 5-6
A/D converters, joystick ports as 9-34
A/D converters, paddle inputs as 9-34
address, accessing printer secondary 6-49
address of a string, finding the starting 4-43
address, package load 10-29
address, printer secondary 1-24
address space (graphic), COMAL-80 5-5
adsr procedure 4-41
advantages, COMAL 3-20,3-30
adventure games in COMAL 11-72
ADVENTURES OF CAPTAIN COMAL explained, AMAZING 1-21
AGAIN procedure 10-65
Ahl's simple benchmark 12-38
AHOY! magazine disks 12-2
AHOY! magazine, letter from 12-72
alarm clock, interrupt driven 5-38
alarm sound procedure 8-35
algebraic set theory 10-17
algorithm : see also emulation, function, procedure,
program, routine, simulation
algorithm, soundex approximate string matching 8-22
aliasing in signal processing 5-42
alignment, 1541 disk drive 7-55
alignment program, 1541 drive 9-34
all'at'once program 5-4
all'at'once2 program bug 5-4
alphabet : see also character, font, letter, text
alphabet images, sprite 4-47
altering a string 12-74
AMAZING ADVENTURES OF CAPTAIN COMAL explained 1-21
Amiga COMAL 10-1
Amiga with Transformer 11-10
Angeles area, COMAL in Los 4-47
angle rotations, Euler 2-16
ANIMATE tutorial 9-64
animation example, sprite 10-44
animation tutorial, sprite 9-64
annotation, disk directory 1-23
Annual Prize, Borge Christensen 11-71
apostrophe in COMAL 9-75
apostrophe in variable name 2-12
APPLE COMAL 10-1,11-12
approximate string matching algorithm, soundex 8-22
April 1984, COMAL standardization meeting of 3-3
APROSPAND-64 bus expander 6-35
APS COMAL, Metanic 5-6
area, COMAL in Los Angeles 4-47
array as parameter tutorial 4-48
array as parameter 6-11,6-39
array, finding the dimensions of an 9-27
array, first element of an 9-27
array, last element of an 9-27
array, mean of an 9-26
array, root mean square of an 9-26
array, standard deviation of an 9-26
array, sum of an 9-26
article corrections, COMMODORE MAGAZINE 1-3
articles, submitting programs and 11-72
ARTIFICIAL INTELLIGENCE FOR SMALL COMPUTERS book 7-56

artificial intelligence program, ELIZA 7-56
artificial intelligence 10-10
ASC and ORD 11-72
ASCII character codes in COMAL 8-61
ASCII code table, Commodore 9-20
ASCII Commodore codes, modified 7-78
ASCII conversion, COMAL 2.0 auto 6-40
ASCII conversion in COMAL 2.0 9-19
assembler : see also machine language, monitor, package
assembler, convert non-Commodore to Commodore 7-61
assisted instruction, computer 2-24
Assisted Student Tutorial Learning Environment, Computer 2-24
AT command, INPUT 6-6
AT field, clear INPUT 11-25
ATOM'HAPPY 10-2
auto ASCII conversion, COMAL 2.0 6-40
auto backup 11-55
auto disk log 6-72
AUTO line numbering 5-10
AUTO mode 6-9
AUTO RUN DEMO Disk directory listing 5-62
auto run for COMAL 0.14 6-54
autocorrelator circuit 5-39
autoexec batch file 12-52
AUTOMATIC DATA program 4-17
automatic executing batch file 12-52
available drive units, testing for 10-73
available, graphics screen-dumps 4-47
available in COMAL, memory 11-74
average : see also mean
awkwardness method, brute force 12-16
axes, logarithmic 7-48
BACKGROUND bug 12-29
background color, determining 3-26
BACKGROUND'COLOR function 2-13
backup, auto 11-55
backup copies 1-16
backup copy 10-41
backup disk 10-60
backup program, disk 10-60
backups, disk 2-27
bank switching 5-36
base conversion, decimal from any 12-23
base conversion, decimal to any 8-35,12-21
base, disk library data 6-50
base manager in COMAL 0.14, data 6-47
base program, data 8-25,11-72
base program, free form data 12-40
base program, telephone number data 10-45
BASE system, DISK DATA 6-50
BASE'CONV bug 11-68
base'conv procedure 5-43
based program, rule 10-16
BASIC and COMAL compared 3-20,4-36,5-17,5-24,6-59
BASIC, exit to COMAL 2.0 from 6-7,10-29
BASIC from COMAL, exit to 1-16,8-7,10-29
BASIC, loading COMAL from 1-4
BASIC, MSX 5-7
BASIC package program 8-75
BASIC program, FAST'BOOT 9-43
BASIC program from COMAL, run a 8-75
BASIC to COMAL bitmap conversion 9-38
BASIC to COMAL, converting 5-21
BASIC to COMAL graphics conversion 9-38
BASIC to COMAL sys command 10-29
BASIC versus COMAL benchmarks 2-35
BASIC/COMAL LOAD check 6-44
batch file, autoexec 12-52
batch file, automatic executing 12-52
batch file from memory 10-31
batch file, looping in a 8-50
batch file maker program 7-58
batch file, making a 8-50
batch file tutorial 6-52,7-30,8-50
batch files define function keys 6-62
batch files from RAM 7-32
batch files in COMAL 2.0 8-50
batch files 6-36
batchfile'maker program 7-59
Batch-Files-From-Memory (CT#7, p.32) correction 12-6
BBC Micro A 11-10
BBC Micro B 11-10
BBS programs, menus in 11-5
beach data file creator, kelly's 12-66
beach (game) program, kelly's 12-62
beach program listing, kelly's 12-68
beginners tutorial 4-25,4-27,5-8
BEGINNING COMAL book review 2-27,3-36,7-36
BEGINNING COMAL book table of contents 4-44
BEGINNING COMAL Disk directory listing 2-18,5-60
being deleted, protecting programs from 8-55
benchmark, Ahl's simple 12-38
benchmark, COMPUTE! 5-1
benchmark, PROMAL 12-38
benchmark, sieve of Eratosthenes 5-1,12-38
benchmark timings, IBM PC 12-39
benchmarks, BASIC versus COMAL 2-35
benchmarks, COMAL 2-30
benchmarks for seventeen languages 12-37
benefits of COMAL 5-34
BEST OF COMAL Disk directory listing 6-81
BEST OF COMAL Disk dir'printer3 bug 11-8
BEST VIC/COMMODORE SOFTWARE book, THE 2-5
between C64 and IBM PC, file transfer 9-12
between COMAL 0.14 and 2.0, syntax differences 6-5
bibliography, COMAL structure 11-77
big letter program 1-17

KEYWORDS AND PHRASES

BIGDUMP'NEC TO bug

- BIGDUMP'NEC routines 5-64
- BIG'LETTER program 1-17
- BIGLETTER/DEMO program listing bug 2-21
- Binder book, Cartridge Tutorial 10-67
- BINDER book review, CARTRIDGE TUTORIAL 7-43
- Binder SETSCORE bug, COMAL-80 Tutorial 11-8
- bitmap : see also drawing, graphics, picture, pixel, screen
- bitmap compression instructions 10-69
- bitmap compression 10-68
- bitmap conversion, BASIC to COMAL 9-38
- bitmap graphics 9-38
- bitmap package, graphics "getscreen" 10-56
- bitmap package 10-56
- bitmap pictures, fastload 9-46
- bit'map'print program 3-32
- black COMAL 2.0 cartridge, schematic for 12-81
- blackbody brightness calculation 7-49
- blocks free, checking disk 10-27
- blot program, RANDOM.PLOT ink 4-53
- board list, COMAL bulletin 5-36
- BOGGLE (game) 10-2
- book, ARTIFICIAL INTELLIGENCE FOR SMALL COMPUTERS 7-56
- book, C64 GRAPHICS WITH COMAL 6-71
- book, Cartridge Tutorial Binder 10-67
- book, COMAL 2.0 Packages 10-67
- book, COMAL YESTERDAY 10-8
- book, LIBRARY OF FUNCTIONS AND PROCEDURES 6-75,10-53
- book review, BEGINNING COMAL 2-27,3-36,7-36
- book review, CAPTAIN COMAL GETS ORGANIZED 2-12,3-36,7-41
- book review, CAPTAIN COMAL'S GRAPHICS PRIMER 7-37
- book review, CARTRIDGE GRAPHICS AND SOUND 7-38
- book review, CARTRIDGE TUTORIAL BINDER 7-43
- book review, COMAL 2.0 PACKAGES 6-40,7-35
- book review, COMAL FROM A TO Z 7-34
- book review, COMAL HANDBOOK 2-9,2-31,7-44
- book review, COMAL LIBRARY OF FUNCTIONS AND PROCEDURES 7-35
- book review, COMAL WORKBOOK 7-34
- book review, COMMODORE 64 GRAPHICS WITH COMAL 7-39
- book review, FOUNDATIONS IN COMPUTER STUDIES WITH COMAL 2-7,3-41,7-40
- book review, GRAPHIC PRIMER 6-21
- book review, STARTING WITH COMAL 10-49,11-13
- book review, STRUCTURED PROGRAMMING WITH COMAL 2-23,7-42
- book, STARTING WITH COMAL 7-11
- book table of contents, BEGINNING COMAL 4-44
- book, THE BEST VIC/COMMODORE SOFTWARE 2-5
- book/disk, PACKAGES LIBRARY 12-3
- booklet, HINTS FOR PROGRAMMING IN COMAL 5-8
- books, COMAL 10-25,11-1
- books for COMAL 7-46
- boot program, KWIK-LOAD 7-25
- boot program, TURBO 64 7-25
- border color, determining 3-27
- BORDER'COLOR function 2-13
- Borge Christensen Annual Prize 11-71
- brick wall, drawing a 10-54
- BRICKS TUTORIAL Disk directory listing 6-81
- bridge game interest, computer 9-45
- brightness calculation, blackbody 7-49
- brute force awkwardness method 12-16
- bubble sort 10-20
- buffer, clearing the keyboard 5-47
- buffer, empty printer 2-28
- buffer'fill procedure, keyboard 6-42
- buffer, keyboard 12-45
- buffer mystery, keyboard 11-25
- buffer, STR\$ simulation using disk 12-25
- buffer, text 11-63
- buffer, VAL simulation using disk 12-25
- bug : see also conflict, correction, error, fix, flaw
- bug, 0.14 list file into 1.02 2-33
- bug, :- 6-75
- bug, :+ 6-75
- bug, all'at'once2 program 5-4
- bug, BACKGROUND 12-29
- bug, BASE'CONV 11-68
- bug, BEST OF COMAL Disk dir'printer3 11-8
- bug, BIGLETTER/DEMO program listing 2-21
- bug, cartridge checking program 7-72
- bug, CARTRIDGE DEMO Disk #03 5-4
- bug, CHECK'CARTRIDGE program 7-72
- bug, COLOR DUMP program 11-37
- bug, color graphics 6-41
- bug, COMAL 0.14 graphing program 7-48
- bug, COMAL Handbook control location 11-8
- bug, COMAL Handbook 11-37
- bug, COMAL SYSTEM DISK 4-55
- bug, COMAL TODAY #02 page-32 4-39
- bug, COMAL-80 Tutorial Binder SETSCORE 11-8
- bug, CUSTOM ERROR MESSAGES 9-7
- bug, DAY'OF'WEEK program 6-63
- bug, decrement 6-75
- bug, DELETE files 2-28
- bug, dir'printer3 11-8
- bug, disk editor program 7-56
- bug, EASY SPRITES program 9-4
- bug, expand'memory program 6-70
- bug, expand'ram program 6-70
- bug, Fast Fourier Transform 11-68
- bug, FFT 11-68
- bug fix, SETRECORDEDELAY random file 6-39
- bug, FORMATTER program 2-21,4-51
- bug, GET\$ modem 5-30
- bug, graphics system 1-23
- bug, ILLUSION 9-7,10-7
- bug in COMAL 0.14, LOAD 6-44

bug, increment integer 4-53,6-75
bug, INPUT 1-14
bug, INT 6-63
bug, JOYSTICK 6-5
bug, KOALA procedure 6-63
bug, LINKing packages, sprites, and fonts 7-50
bug, LOAD command 7-50
bug, lp'condense program 5-23
bug, MAKE'OBJECT'FILE 9-7
bug, MICROSCRIBBLE program 2-21
bug, OKI92'TEST 10-7
bug, PADDLE 6-5
bug, PRINTSCREEN offset parameter 6-38
bug, put'char procedure 5-42
bug, random file 1-24,2-4,3-18,6-38,7-17,8-33
bug, SAMPLER disk 4-55
bug, savescreen program 5-37
bug, scrolling text 9-63
bug, SELECT "DS:" 1-24
bug, SELECT "LP:" and CAT 1-25
bug, SEQ'TO'SPEED 9-46
bug, Soundex 11-8
bug, Speedscript convertor 9-46
bug, SPEED'TO'SEQ 9-46
bug, sprite 10-25
bug, SPRITE'DESIGNER program 2-21
bug, SPRITEINQ 10-25
bug, TOGGLE'KEYS 9-7
bug, window'down 9-63
bug, window'up 9-63
bug, word game 11-8
building a video detector (hardware) 7-55
built-in error messages, COMAL 0.14 4-23
bulletin board list, COMAL 5-36
bus expander, APROSPAND-64 6-35
bus expander, CARDBOARD 5 6-35
BUSCARD and COMAL 2.0 7-33
BUSCARD and disk directory 2-28
BUSCARD, cartridge and 5-35
BUSCARD, COMAL and 3-4
BUSCARD monitor from COMAL 7-33
BUSCARD 1-26
COMAL 0.14, CAT listing pause for 5-31
C128 80 column screen 11-26
C128 80 column video chip 12-3
C128 and COMAL 9-6
C128, cartridge and 6-5,12-77
C128 clock speed, changing 10-29
C128 FAST mode 12-77
C64 and IBM COMAL compatibility 6-53
C64 and IBM PC, file transfer between 9-12
C64 by modem, control 12-75
C64 GRAPHICS WITH COMAL book 6-71
C64 LINK 1-22,1-26,2-6

C64, remote controlled 12-75
C64 versus PET memory locations 1-2
CAI 2-24
calculating water pressure drop in pipes 7-71
calculation, blackbody brightness 7-49
Camp, Lincoln College Commodore Computer 7-29,8-1
CAPTAIN COMAL explained, AMAZING ADVENTURES OF 1-21
CAPTAIN COMAL GETS ORGANIZED book review 2-12,3-36,7-41
CAPTAIN COMAL GETS ORGANIZED Disk directory listing 2-19
CAPTAIN COMAL GETS ORGANIZED 10-61
CAPTAIN COMAL SERIES explained 1-26
CAPTAIN COMAL'S GRAPHICS PRIMER book review 7-37
CARDBOARD 5 bus expander 6-35
CARDco +G printer interface, COMAL and 3-4
Cardco +G/printer procedures 9-66
Cardprint +G/printer procedures 9-66
cartoon 12-25
cartridge, 1541 Express drive speed up 4-17
cartridge and BUSCARD 5-35
cartridge and C128 6-5,12-77
cartridge and CIE IEEE interface 5-35
cartridge and INTERPOD 5-35
cartridge checking program bug 7-72
cartridge checking program, COMAL 6-40
cartridge, COMAL 0.14 on 3-29
cartridge, COMAL 0.14 11-58
cartridge compatibility with other programs 6-38
cartridge control key values 6-7,6-34,11-14
CARTRIDGE DEMO Disk #01 directory listing 5-63
CARTRIDGE DEMO Disk #02 directory listing 5-63
CARTRIDGE DEMO Disk #03 bug 5-4
CARTRIDGE DEMO Disk #03 directory listing 5-64
CARTRIDGE DEMO Disk #04 directory listing 5-64
cartridge design (hardware), COMAL 6-27
cartridge empty socket 5-3,12-74
cartridge, examining memory in the COMAL 7-59
cartridge function keys 6-7
CARTRIDGE GRAPHICS AND SOUND book review 7-38
cartridge (hardware), chips in the 7-55
cartridge history, COMAL 5-2
cartridge installation, safe 7-74
cartridge memory map, COMAL 2.0 6-22
cartridge, opening COMAL 6-35
cartridge, plain COMAL 6-38
cartridge, printer interface and 6-11
cartridge" program, "check 8-6
cartridge, QUICK CHIP for the COMAL 2.0 8-1
cartridge review, COMAL 0.14 4-16
cartridge review, COMAL 4-9
cartridge, RTC MULTI-LINK networking 3-29
cartridge schematic, COMAL 2.0 12-0
cartridge, schematic for black COMAL 2.0 12-81
cartridge, SX-64 and COMAL 6-36
CARTRIDGE TUTORIAL BINDER book review 7-43

KEYWORDS AND PHRASES
Cartridge TO collision

Cartridge Tutorial Binder book 10-67
cartridge tutorial, COMAL 6-3,6-6,6-8
CASE and ON/GOTO 11-72
case characters, PLOTTEXT for lower 3-17
CASE command 1-6
case in COMAL 1-4
case, LIST in upper and lower 3-35,9-6,10-6
case mode lock 4-37,6-41,7-78
case mode, switching 7-78
case mode unlock 6-41
case PLOTTEXT in COMAL 0.14, improved lower 6-54
case PLOTTEXT in COMAL 0.14, lower 6-43
case printing, lower 2-28
case program listing, COMAL 0.14 mixed 5-22
CASE tutorial 11-4
cassette and COMAL, tape 1-19,1-25
CASTLE education system 2-24
CAT and DIR commands 6-39
CAT and IEEE printer 3-35
CAT bug, SELECT "LP:" and 1-25
CAT command tutorial 11-22
CAT command 6-35,10-26
CAT listing pause for COMAL 0.14 5-31
catalog : see also data base, inventory, mail list
catalog, COMAL programs 5-11
CHAIN command 1-6
CHANGE command 6-7
change'dev procedure 8-43
changing a function in a running program 10-64
changing C128 clock speed 10-29
changing disk drive device number 8-43,10-42
changing graphics turtle image 5-33
changing screen colors 10-52
changing sprite images 9-30
changing turtle coordinates 3-24
character codes in COMAL, ASCII 8-61
character generator, accessing RAM under I/O and 3-43
character limit, function key 32 7-77
character PEEK value 2-31
character ROM access from COMAL 2.0 6-37
character set, 80 column 7-54
character to screen, POKE 2-31
characters, Chinese 5-18
characters, custom 12-79
characters permitted in variable names 2-12
characters, PLOTTEXT for graphics 3-17
characters, PLOTTEXT for lower case 3-17
characters, PLOTTEXT for reverse 3-17
characters, PLOTTEXT reverse field 4-27
chart, pie 3-5
chart, turtle graphics 1-13
check, BASIC/COMAL LOAD 6-44
"check cartridge" program 8-6
checkbook register 12-31

CHECK'CARTRIDGE program bug 7-72
checking disk blocks free 10-27
checking program bug, cartridge 7-72
checking program, COMAL cartridge 6-40
checking remaining memory 11-38
chess problem, Eight Queens 5-11
Chinese characters 5-18
chip, C128 80 column video 12-3
chip, custom EPROM 12-3
CHIP for the COMAL 2.0 cartridge, QUICK 8-1
chips in the cartridge (hardware) 7-55
Christensen Annual Prize, Borge 11-71
CIE IEEE interface, cartridge and 5-35
CIE IEEE interface, COMAL and 3-4
CIE IEEE interface support code, relocating 3-34
CIE interface 1-26
CIRCLE simulation routine 3-24
circles, round 12-79
circuit, autocorrelator 5-39
circuit emulator, logic 5-39
circular clock program 4-29
clarified, COMAL versions 1-1
clear INPUT AT field 11-25
clear sprite collision flags 2-30
CLEAR 10-50
CLEAR'COLLISIONS procedure 2-30
clearing the keyboard buffer 5-47
clear'keys procedure 5-47
clock demo program, digital 5-20
clock, interrupt driven alarm 5-38
clock program, circular 4-29
clock program, machine language 5-26
clock program, sprite digital 3-43
clock speed, changing C128 10-29
clock, time-of-day 5-38
clock, TOD 5-38
closing disk files 11-25
CLOUD'FLUX.LIST graphing program example 7-48
clouds, interstellar dust 7-48
Club, starting a COMAL 2-22,10-48
Coast Commodore Show (humor), West 6-18
code from disk, load machine 6-82
code procedures, Epson FX-80 printer 6-65,9-66
code, relocating CIE IEEE interface support 3-34
code table, Commodore ASCII 9-20
code to DATA statements, convert machine 7-60
code trainer, HAM radio 9-48
codes in COMAL, ASCII character 8-61
codes, key display 9-22
codes, modified ASCII Commodore 7-78
codes, SELECT and printer control 2-28
codes to printer, sending escape 6-49
College Commodore Computer Camp, Lincoln 7-29,8-1
collision detection, sprite 10-24

collision flags, clear sprite 2-30
colon in COMAL 11-73
color combination suggestions 1-9,2-13
color combination table 2-13
color, determining background 3-26
color, determining border 3-27
color, determining pen 3-25
color, determining sprite 3-25
COLOR DUMP program bug 11-37
color graphics bug 6-41
color INPUT, two 12-75
color mix program 5-20
"color" screen-dump, Gemini-10x 9-67
colors and gray shades table 2-13
colors, changing screen 10-52
colors, modifying default screen 10-29
colors program, 127 5-20
column character set, 80 7-54
column directory list, two 6-43
column file printer, two 12-12
column screen, C128 80 11-26
column screens and COMAL, 80 11-75
column video chip, C128 80 12-3
COMAL 0.14 and 2.0 differences 12-42
COMAL 0.14 built-in error messages 4-23
COMAL 0.14 cartridge review 4-16
COMAL 0.14 cartridge 11-58
COMAL 0.14 copyright 6-42
COMAL 0.14 distribution right 6-42
COMAL 0.14 ENHANCER program 12-3,12-4
COMAL 0.14 error messages list 2-21,11-82
COMAL 0.14 extra memory 5-19
COMAL 0.14 function keys 1-13
COMAL 0.14 GRAPHICS EDITOR disk 9-2
COMAL 0.14 graphics tutorial 6-55,6-56
COMAL 0.14 graphics 10-50
COMAL 0.14 graphing program bug 7-48
COMAL 0.14 memory locations 5-19
COMAL 0.14 memory map (graphic) 3-42
COMAL 0.14 memory map 2-5,3-22,4-19,6-28
COMAL 0.14 memory usage 2-34
COMAL 0.14 mixed case program listing 5-22
COMAL 0.14 name table 4-42
COMAL 0.14 on cartridge 3-29
COMAL 0.14 SYSTEM Disk directory listing 2-18
COMAL 0.14/2.0 WRITE file incompatibility 7-51
COMAL 2.0 and 0.14 differences 6-13
COMAL 2.0 and 0.14 keyword comparison 6-12
COMAL 2.0 auto ASCII conversion 6-40
COMAL 2.0 cartridge memory map 6-22
COMAL 2.0 cartridge schematic 12-0
COMAL 2.0 device numbers 6-11
COMAL 2.0 disk editor program 7-56
COMAL 2.0 dynamic keyboard substitute 10-31

COMAL 2.0 file access 6-14
COMAL 2.0 graphics commands 6-8
COMAL 2.0 keywords 11-30
COMAL 2.0 not on disk 4-18,6-39
COMAL 2.0 PACKAGES book review 6-40,7-35
COMAL 2.0 Packages book 10-67
COMAL 2.0 packages keyword list 12-54
COMAL 2.0 split screen 6-9
COMAL 2.0 sprite quirks 10-24
COMAL 2.0 token table 9-54
COMAL ACE 10-2
COMAL advantages 3-20,3-30
COMAL and BUSCARD 3-4
COMAL and CARDCO +G printer interface 3-4
COMAL and CIE IEEE interface 3-4
COMAL and education 11-76
COMAL and hard disks 11-75
COMAL and INTERPOD 3-4
COMAL and MSD disk drives 3-4
COMAL and MULTI-LINK 3-4
COMAL benchmarks 2-30
COMAL books 10-25,11-1
COMAL bulletin board list 5-36
COMAL cartridge checking program 6-40
COMAL cartridge design (hardware) 6-27
COMAL cartridge history 5-2
COMAL cartridge review 4-9
COMAL cartridge tutorial 6-3,6-6,6-8
COMAL execution speed 6-17
COMAL fastloader 10-41
COMAL FONT Disk #01 10-30
COMAL FROM A TO Z book review 7-34
COMAL FROM A TO Z 6-68
COMAL HANDBOOK book review 2-9,2-31,7-44
COMAL Handbook bug 11-37
COMAL Handbook control location bug 11-8
COMAL HANDBOOK Danish edition 4-39
COMAL HANDBOOK Disk directory listing 2-20,5-59
COMAL implementations list 3-13,5-6
COMAL in education 11-69
COMAL in Europe 2-11
COMAL in Los Angeles area 4-47
COMAL in school 1-3,2-24,9-4,9-8,12-49
COMAL in the Netherlands 3-5
COMAL internal tables 5-13
COMAL kernal 1-26,3-3,4-55,6-53
COMAL keyword list 11-30
COMAL keyword table memory location 5-16
COMAL LIBRARY OF FUNCTIONS AND PROCEDURES book review 7-35
COMAL machine language monitors 12-48
COMAL memory limitations 1-5
COMAL memory map comment 5-54
COMAL memory map 11-73

KEYWORDS AND PHRASES

COMAL TO command

COMAL name explained 4-17
 COMAL name table 5-14
 COMAL origins 1-8,2-11
 COMAL programs catalog 5-11
 COMAL QUICK 0.14 8-1
 COMAL QUICK fastloader for COMAL 0.14 9-7
 COMAL reboot routine 11-24
 COMAL REFERENCE GUIDE 6-68
 COMAL SAMPLER disk 3-13
 COMAL school price list 9-9
 COMAL shirt 3-3
 COMAL shortcuts 2-23
 COMAL SONG (humour) 7-52
 COMAL standard 1-26,6-53
 COMAL standardization meeting of April 1984 3-3
 COMAL STARTER KIT review 6-44
 COMAL strings tutorial 5-23
 COMAL structure bibliography 11-77
 COMAL SYSTEM DISK bug 4-55
 COMAL teachers list 9-4
 COMAL to FORTRAN conversion 4-52
 COMAL TODAY #02 page-32 bug 4-39
 COMAL TODAY European distributor 6-46
 COMAL token list 5-15
 COMAL translator explained 5-12
 COMAL tutorial 7-22
 COMAL user group information 5-64
 COMAL Using Educators list 7-4
 COMAL version 1.02 2-30
 COMAL versions clarified 1-1
 COMAL versus Pascal 3-20
 COMAL WORKBOOK book review 7-34
 COMAL YESTERDAY book 10-8
 COMAL-80 address space (graphic) 5-5
 COMAL-80 graphic memory map 5-5
 COMAL-80 standardization meeting 2-17
 COMAL-80 Tutorial Binder SETSCORE bug 11-8
 COMAL-80 6-13,6-35
 COMAL'DUMP for Gemini 10 4-33
 COMALERRORS 10-40
 comal'keypad.14 program 6-17
 comal'keypad'2.0 program 6-16
 COMAL'S GRAPHICS PRIMER book review, CAPTAIN 7-37
 combination suggestions, color 1-9,2-13
 combination table, color 2-13
 combine strings with & 5-16
 comma in print statement 5-12
 command and screen-dump, VIEWPORT 6-27
 command, BASIC to COMAL sys 10-29
 command bug, LOAD 7-50
 command, CASE 1-6
 command, CAT 6-35,10-26
 command, CHAIN 1-6
 command, CHANGE 6-7
 command, CON 5-25
 command, COPY 10-27
 command, CURSOR 6-6,11-75
 command, DEFINE 10-43
 command, device number in 0.14 DIR 10-28
 command, DIR 10-27,10-28
 command, DISPLAY 6-10
 command, EDIT 1-19
 command evaluator 10-65
 command, FIND 6-7
 command for COMAL 0.14, FIND 6-61
 command, FRAME 8-6,11-75
 command, FREE 11-38
 command, IDENTIFY 10-44
 command, IMPORT 6-11
 command, INPUT AT 6-6
 command, INPUT 1-24,6-36
 command, INTERRUPT 8-62
 command, LINEFEED 3-10,9-5
 command, LIST 1-25
 command, MERGE 6-9
 command, MOD 10-44
 command, MOUNT 10-28
 command not implemented, DEBUG 5-16
 command, OPEN FILE 1-25
 command, PLOT 10-51
 command, PRINT USING 1-24
 command, SELECT 6-11
 command, SERIAL 5-35
 command, SETGRAPHIC 1-13,10-50,10-52
 command, SETMSG 2-30
 command, SETRECORDDELAY 6-5,6-39
 command, SHOWSPRITE 6-8
 command, SIZE 11-38
 command, SPRITEINQ 10-24
 command, STATUS 10-26
 command, STOPSPRITE 10-24
 command, TEXTCOLOR 6-9
 command, TIME 11-38
 command, TRACE 6-6,6-15
 command tutorial, CAT 11-22
 command tutorial, DIR 11-22
 command tutorial, INPUT 3-7,7-49,7-77
 command tutorial, LINKSHAPE 5-5
 command tutorial, LOADSHAPE 5-5
 command tutorial, OPEN 4-51
 command tutorial, PASS 5-8,10-26
 command tutorial, PRINT 4-50
 command tutorial, RESTORE 7-67
 command tutorial, SELECT 5-36
 command tutorial, SETPAGE 6-62
 command, USE 10-11
 command, VERIFY 12-79
 command, WINDOW 11-75,12-79

command, WINDOW 12-79
commands, CAT and DIR 6-39
commands, COMAL 2.0 graphics 6-8
commands, graphics 10-50
comment, COMAL memory map 5-54
comment, TUTORIAL DISK 5-49
Commodore 64, examining memory in the 7-59
COMMODORE 64 GRAPHICS WITH COMAL book review 7-39
Commodore ASCII code table 9-20
Commodore assembler, convert non-Commodore to 7-61
Commodore codes, modified ASCII 7-78
Commodore Computer Camp, Lincoln College 7-29,8-1
COMMODORE MAGAZINE article corrections 1-3
Commodore printer graphics screen-dump 4-30
COMMODORE radio show, FOCUS ON 3-9
Commodore Show (humor), West Coast 6-18
Commodore Users Group, United States 3-20
common divisor function, greatest 8-40
common factor function, greatest 8-40
communications program, DIRECT'CON 9-12
compacted picture system 11-61
compacting hires pictures 10-68
compactor, graphics screen 10-68
Compactor, Picture 10-1
compared, BASIC and COMAL 3-20,4-36,5-17,5-24,6-59
comparing disk files 10-70
comparison, COMAL 2.0 and 0.14 keyword 6-12
comparison, file 10-70
compatibility, C64 and IBM COMAL 6-53
compatibility of COMAL 2.0 and 0.14 6-79
compatibility with other programs, cartridge 6-38
compiler, run-time 11-77
complex hyperbolic functions 2-16
complex radical program 7-68
Composer music files, Master 9-22
compression, bitmap 10-68
compression, graphics screen 10-69
compression instructions, bitmap 10-69
compression system, picture 10-61
COMPUERVE network 2-26,9-1
COMPUTE! benchmark 5-1
computer, ACORN 1-2
computer assisted instruction 2-24
Computer Assisted Student Tutorial Learning Environment
2-24
computer bridge game interest 9-45
Computer Camp, Lincoln College Commodore 7-29,8-1
Computer Education Society of Ireland 2-17
computer log program 6-72
Computer Show, MARCA 8-1
COMPUTER STUDIES WITH COMAL book review, FOUNDATIONS IN
2-7,3-41,7-40
COMPUTER STUDIES WITH COMAL Disk directory listing,
FOUNDATIONS IN 2-20,5-60
computer, TED 1-2
COMPUTERS book, ARTIFICIAL INTELLIGENCE FOR SMALL 7-56
COMSYMB file 6-38
CON command 5-25
CONNECTION printer interface 10-66
contents, BEGINNING COMAL book table of 4-44
control C64 by modem 12-75
control codes, SELECT and printer 2-28
control H 6-41
control I 6-41
control key values, cartridge 6-7,6-34,11-14
control location bug, COMAL Handbook 11-8
control P print text screen 5-28,7-57
control, paddle 1-18
control program, 8023P printer 2-29
control routines, sound 4-40
control U key in COMAL 2.0 8-33
controlled C64, remote 12-75
convention, program header 1-22,9-18
convention, program name 1-22
conventions, file name 1-16,4-49,6-70,10-77,12-33
conversion, BASIC to COMAL bitmap 9-38
conversion, BASIC to COMAL graphics 9-38
conversion, COMAL 2.0 auto ASCII 6-40
conversion, COMAL to FORTRAN 4-52
conversion, decimal from any base 12-23
conversion, decimal to any base 8-35,12-21
conversion, graphics file 11-61
conversion, hexadecimal 4-39
conversion in COMAL 2.0, ASCII 9-19
conversion programs, Speedscript 11-74
convert machine code to DATA statements 7-60
convert non-Commodore to Commodore assembler 7-61
CONVERT procedure 2-6,12-22
convert'base function 8-35
converter, Speedscript to sequential file 8-56
converter, SPRITE-MASTER image file 8-46
converters, joystick ports as A/D 9-34
converters, paddle inputs as A/D 9-34
converting 0.14 programs to 2.0 12-42
converting a program to a package 9-73
converting BASIC to COMAL 5-21
converting numbers to words 10-12
convertor bug, Speedscript 9-46
coordinates, changing turtle 3-24
coordinates, determining sprite 3-25
coordinates, determining turtle 3-24
copies, backup 1-16
copy, backup 10-41
COPY command 10-27
copy files with two 1541 drives 10-71
copy random file 6-37
copy relative file 6-37
copy with two 1541 drives 4-18

KEYWORDS AND PHRASES
COPY'FILE TO determining

COPY'FILE procedure 10-70
COPYFILES.BASIC 10-41
copying files 10-70
copyright, COMAL 0.14 6-42
correct'disk program 11-16
correcting for rounding errors 9-32
correction, Batch-Files-From-Memory (CT#7, p.32) 12-6
corrections, COMMODORE MAGAZINE article 1-3
correlator program 5-40
CP/M COMAL 11-10
CREATE random files simulation routine 3-27
CREATE simulation routine 3-24
creator, kelly's beach data file 12-66
.crg suffix 10-68,11-61
(CT#7, p.32) correction, Batch-Files-From-Memory 12-6
CURCOL simulation routine 3-24,3-27
CURROW simulation routine 3-24,3-27
CURSOR command 6-6,11-75
cursor for joystick 7-77
cursor position, determining 3-27
cursor positioning 3-27
CURSOR simulation routine 3-24,3-27
curve graphing program, least squares 6-74
curve, limacon 5-50
curve, rose 5-50
curved lines, drawing 10-53
Curves program, Easy 10-77
custom characters 12-79
custom EPROM chip 12-3
CUSTOM ERROR MESSAGES bug 9-7
custom error messages 3-7,8-66
DAC procedure 10-12
Danish edition, COMAL HANDBOOK 4-39
Dansk Data Elektronik COMAL 5-6
data base : see also catalog, inventory, mail list
data base, disk library 6-50
data base manager in COMAL 0.14 6-47
data base program, free form 12-40
data base program, telephone number 10-45
data base program 8-25,11-72
DATA BASE system, DISK 6-50
Data Elektronik COMAL, Dansk 5-6
data entry with function key 11-24
data file creator, kelly's beach 12-66
data file, DATA statements from sprite 12-65
data files, running SEQ type 5-9
DATA program, AUTOMATIC 4-17
DATA reading in COMAL 2.0, quick 7-67
DATA statements, convert machine code to 7-60
DATA statements from machine language 6-36
DATA statements from sprite data file 12-65
DATA statements from sprite shape file 8-45
data statements, modifying 10-17
datasette 1-25
date function, Julian 8-47
Datorer COMAL, Teli 5-6
David's Directory Designer 11-58
day, Julian 9-76
DAY'OF'WEEK program bug 6-63
DEBUG command not implemented 5-16
decimal from any base conversion 12-23
decimal to any base conversion 8-35,12-21
decision tree 10-16
decrement bug 6-75
default OFFSET values, LIGHTPEN 6-38
default screen colors, modifying 10-29
DEFINE command 10-43
define function keys, batch files 6-62
definitions, long function key 9-33
definitions, saving function key 9-33
defkey examples 6-62
DEFKEY tutorial 7-21
DELAY time units, lightpen 6-38
DELETE files bug 2-28
delete key 7-19
DELETED files 1-23
deleted, protecting programs from being 8-55
deleting program lines 11-73
de-LINKing a package 11-65
Delphi network 9-1
DEMO Disk #01 directory listing, CARTRIDGE 5-63
DEMO Disk #02 directory listing, CARTRIDGE 5-63
DEMO Disk #03 bug, CARTRIDGE 5-4
DEMO Disk #03 directory listing, CARTRIDGE 5-64
DEMO Disk #04 directory listing, CARTRIDGE 5-64
DEMO Disk directory listing, AUTO RUN 5-62
demo program, digital clock 5-20
demo, statistics 11-37
depreciation schedule program 8-52
derivative of a function 11-66
design (hardware), COMAL cartridge 6-27
Designer, David's Directory 11-58
detecting drive type 9-36
detection, SETMSG state 10-29
detection, sprite collision 10-24
detector (hardware), building a video 7-55
determining background color 3-26
determining border color 3-27
determining cursor position 3-27
determining pen color 3-25
determining pen state 3-25
determining screen state 3-26
determining sprite color 3-25
determining sprite coordinates 3-25
determining sprite size 3-25
determining sprite state 3-25
determining turtle coordinates 3-24
determining turtle heading 3-24

determining turtle size 3-25
determining turtle state 3-25
deviation of an array, standard 9-26
device : see also directory, disk drive, files
device number, changing disk drive 8-43,10-42
device number in 0.14 DIR command 10-28
device numbers, COMAL 2.0 6-11
device numbers in COMAL 2.0 6-36
device, paddle ports as a measuring 9-34
device power requirements, peripheral 12-76
device, SELECT "LP:" for any 3-35
differences between COMAL 0.14 and 2.0, syntax 6-5
differences, COMAL 0.14 and 2.0 12-42
differences, COMAL 2.0 and 0.14 6-13
differential equation solver 7-73
differentiation program, symbolic 9-53
differentiation, symbolic 11-66
digital clock demo program 5-20
digital clock program, sprite 3-43
dimensional fractals on 1520 plotter, three 12-26
dimensional molecule program, three 6-32
dimensions of an array, finding the 9-27
DIR command, device number in 0.14 10-28
DIR command tutorial 11-22
DIR command 10-27,10-28
DIR commands, CAT and 6-39
direct reduction repayment program 8-60
DIRECT'CON communications program 9-12
DIRECT'CON program listing 9-14
directories for disk sleeves, disk 11-40
directories, sorting disk 8-55
directory : see also device, disk drive, files
directory annotation, disk 1-23
directory, BUSCARD and disk 2-28
Directory Designer, David's 11-58
directory editor, disk 3-6,8-55
directory, INTERPOD and disk 2-28
directory list, two column 6-43
directory listing, 2.0 PACKAGES Disk 7-79
directory listing, AUTO RUN DEMO Disk 5-62
directory listing, BEGINNING COMAL Disk 2-18,5-60
directory listing, BEST OF COMAL Disk 6-81
directory listing, BRICKS TUTORIAL Disk 6-81
directory listing, CAPTAIN COMAL GETS ORGANIZED Disk 2-19
directory listing, CARTRIDGE DEMO Disk #01 5-63
directory listing, CARTRIDGE DEMO Disk #02 5-63
directory listing, CARTRIDGE DEMO Disk #03 5-64
directory listing, CARTRIDGE DEMO Disk #04 5-64
directory listing, COMAL 0.14 SYSTEM Disk 2-18
directory listing, COMAL HANDBOOK Disk 2-20,5-59
directory listing, font.master #01 Disk 10-77
directory listing, FOUNDATIONS IN COMPUTER STUDIES WITH COMAL Disk 2-20,5-60

directory listing, GET ORGANIZED Disk 5-61
directory listing, GRAPHIC PRIMER Disk 5-62
directory listing, MODEM Disk 7-79
directory listing, PET COMAL DISK 2-19
directory listing, PROC & FUNC Disk 5-61
directory listing, SAMPLER DISK 5-62
directory listing, SLIDE SHOW #01 Disk 5-62
directory listing, SLIDE SHOW #02 Disk 5-62
directory listing, STRUCTURED PROGRAMMING WITH COMAL Disk 2-19,5-60
directory listing, TODAY #01 Disk 2-18
directory listing, TODAY #01 Disk 5-57
directory listing, TODAY #02 Disk 5-57
directory listing, TODAY #03 Disk 4-54
directory listing, TODAY #03 Disk 5-57
directory listing, TODAY #04 Disk 5-57
directory listing, TODAY #05 Disk 5-58
directory listing, TODAY #06 Disk 6-81
directory listing, TODAY #07 Disk 7-79
directory listing, TODAY #08 Disk 8-77
directory listing, TODAY #09 Disk 9-77
directory listing, TODAY #11 Disk 12-78
directory listing, TUTORIAL Disk 4-54,5-62
directory listing, USER GROUP #01 Disk 4-14
directory listing, USER GROUP #01 Disk 5-58
directory listing, USER GROUP #02 Disk 4-54
directory listing, USER GROUP #02 Disk 5-58
directory listing, USER GROUP #03 Disk 5-58
directory listing, USER GROUP #04 Disk 5-59
directory listing, USER GROUP #05 Disk 5-59
directory listing, USER GROUP #06 Disk 5-59
directory listing, USER GROUP #07 Disk 6-81
directory listing, USER GROUP #08 Disk 7-79
directory listing, USER GROUP #09 Disk 6-81
directory listing, USER GROUP #10 Disk 9-77
directory listing, USER GROUP #11 Disk 10-77
directory listing, UTILITY Disk #02 9-77
directory listings, paste-on 11-40
directory, order of disk 1-23
directory procedure 8-68
DIRECTORY program, FAST 8-68
directory reader, improved fast 12-50
directory reading program, fast 7-58
directory to a printer, listing a disk 9-6
dir'list program 9-6
dir'printer3 bug, BEST OF COMAL Disk 11-8
dir'printer3 bug 11-8
disable, RESTORE key 7-78,10-29
disassembler program 7-59
discussion, EOF usage 4-51
Disk #01, COMAL FONT 10-30
Disk #01 directory listing, CARTRIDGE DEMO 5-63
Disk #02 directory listing, CARTRIDGE DEMO 5-63
Disk #02 directory listing, UTILITY 9-77

KEYWORDS AND PHRASES

Disk TO Disk

Disk #03 bug, CARTRIDGE DEMO 5-4
 Disk #03 directory listing, CARTRIDGE DEMO 5-64
 Disk #03 review, TODAY 3-4
 Disk #04 directory listing, CARTRIDGE DEMO 5-64
 disk backup program 10-60
 disk, backup 10-60
 disk backups 2-27
 disk blocks free, checking 10-27
 disk buffer, STR\$ simulation using 12-25
 disk buffer, VAL simulation using 12-25
 DISK bug, COMAL SYSTEM 4-55
 disk bug, SAMPLER 4-55
 disk, COMAL 0.14 GRAPHICS EDITOR 9-2
 disk, COMAL 2.0 not on 4-18,6-39
 disk, COMAL SAMPLER 3-13
 DISK comment, TUTORIAL 5-49
 DISK DATA BASE system 6-50
 disk directories for disk sleeves 11-40
 disk directories, sorting 8-55
 disk directory annotation 1-23
 disk directory, BUSCARD and 2-28
 disk directory editor 3-6,8-55
 disk directory, INTERPOD and 2-28
 Disk directory listing, 2.0 PACKAGES 7-79
 Disk directory listing, AUTO RUN DEMO 5-62
 Disk directory listing, BEGINNING COMAL 2-18,5-60
 Disk directory listing, BEST OF COMAL 6-81
 Disk directory listing, BRICKS TUTORIAL 6-81
 Disk directory listing, CAPTAIN COMAL GETS ORGANIZED 2-19
 Disk directory listing, COMAL 0.14 SYSTEM 2-18
 Disk directory listing, COMAL HANDBOOK 2-20,5-59
 Disk directory listing, font.master #01 10-77
 Disk directory listing, FOUNDATIONS IN COMPUTER STUDIES WITH COMAL 2-20,5-60
 Disk directory listing, GET ORGANIZED 5-61
 Disk directory listing, GRAPHIC PRIMER 5-62
 Disk directory listing, MODEM 7-79
 DISK directory listing, PET COMAL 2-19
 Disk directory listing, PROC & FUNC 5-61
 DISK directory listing, SAMPLER 5-62
 Disk directory listing, SLIDE SHOW #01 5-62
 Disk directory listing, SLIDE SHOW #02 5-62
 Disk directory listing, STRUCTURED PROGRAMMING WITH COMAL 2-19,5-60
 Disk directory listing, TODAY #01 2-18
 Disk directory listing, TODAY #01 5-57
 Disk directory listing, TODAY #02 5-57
 Disk directory listing, TODAY #03 4-54
 Disk directory listing, TODAY #03 5-57
 Disk directory listing, TODAY #04 5-57
 Disk directory listing, TODAY #05 5-58
 Disk directory listing, TODAY #06 6-81
 Disk directory listing, TODAY #07 7-79
 Disk directory listing, TODAY #08 8-77
 Disk directory listing, TODAY #09 9-77
 Disk directory listing, TODAY #11 12-78
 Disk directory listing, TUTORIAL 4-54,5-62
 Disk directory listing, USER GROUP #01 4-14
 Disk directory listing, USER GROUP #01 5-58
 Disk directory listing, USER GROUP #02 4-54
 Disk directory listing, USER GROUP #02 5-58
 Disk directory listing, USER GROUP #03 5-58
 Disk directory listing, USER GROUP #04 5-59
 Disk directory listing, USER GROUP #05 5-59
 Disk directory listing, USER GROUP #06 5-59
 Disk directory listing, USER GROUP #07 6-81
 Disk directory listing, USER GROUP #08 7-79
 Disk directory listing, USER GROUP #09 6-81
 Disk directory listing, USER GROUP #10 9-77
 Disk directory listing, USER GROUP #11 10-77
 disk directory, order of 1-23
 disk directory to a printer, listing a 9-6
 Disk dir'printer3 bug, BEST OF COMAL 11-8
 disk drive : see also device, directory, files
 disk drive alignment, 1541 7-55
 disk drive device number, changing 8-43,10-42
 disk drive, examining memory in the 1541 7-59
 disk drive, examining programs on the 7-59
 disk drive unit 9, PASS to 6-11,6-37
 disk drives, COMAL and MSD 3-4
 disk editor program bug 7-56
 disk editor program, COMAL 2.0 7-56
 disk errors, fixing 11-16
 disk files, closing 11-25
 disk files, comparing 10-70
 DISK, FONT 9-2
 disk FORMAT in COMAL 6-5
 Disk, Games 10-1
 disk, ICON 11-2
 disk ID, shifted letter in 4-55
 disk, indented program LIST to 4-18,5-36,6-43,7-78
 disk library data base 6-50
 disk, LIST to 6-10
 disk, load graphics screen from 3-39
 disk, load machine code from 6-82
 disk log, auto 6-72
 disk, MATH AND SCIENCE 9-2
 disk, RAM 11-63
 disk, save graphics screen to 3-38
 disk, save memory to 3-37
 disk series, USER GROUP 6-42
 disk set, 19 6-44
 disk sleeves, disk directories for 11-40
 disk, startup 10-41
 disk, THE GRAPHICS TOOLBOX 9-2
 disk, TYPING TUTOR 9-2
 Disk, TYPING 10-1

DISK'DATA'BASE 11-72
 disk'editor program 5-45
 disks, AHOY! magazine 12-2
 disks, COMAL and hard 11-75
 disks explained, USER GROUP 4-12
 disks, formatting 5-9
 disks, "free" COMAL 9-22
 disks, master 9-28
 disks, SLIDE SHOW 9-38
 disks, two sided 9-28
 display codes, key 9-22
 DISPLAY command 6-10
 displaying a program name table 5-46
 distribution right, COMAL 0.14 6-42
 distributor, COMAL TODAY European 6-46
 divisor function, greatest common 8-40
 dodge'em program (game) 4-38
 dog'chases'cat program (game) 5-32
 Doodle pictures 11-61
 double precision logical functions 1-20
 double size graphics dump for NEC printer 5-64
 DOUBLER program 12-12
 double-size graphics screen-dump 4-32
 down text screen, scroll 4-50
 drawing : see also bitmap, graphics, picture, pixel,
 screen
 drawing a brick wall 10-54
 drawing a line 10-51
 drawing curved lines 10-53
 drawing in COMAL 0.14 10-50
 drawing polygons 10-51,10-53
 drawing program, joystick 1-18
 drawing program 10-43
 draw'molecules program 6-32
 drive, 1571 as dual 12-77
 drive alignment, 1541 disk 7-55
 drive alignment program, 1541 9-34
 drive device number, changing disk 8-43,10-42
 drive, examining memory in the 1541 disk 7-59
 drive, examining programs on the disk 7-59
 drive, function keys for the MSD dual 9-32
 drive mode, switch 1571 to 1541 12-77
 drive, MSD Dual 10-26
 drive number, specifying 12-46
 drive speed up cartridge, 1541 Express 4-17
 drive speedup, RABBIT package 1541 12-5
 drive type, detecting 9-36
 drive unit 9, PASS to disk 6-11,6-37
 drive units, testing for available 10-73
 driven alarm clock, interrupt 5-38
 driver procedures, 1520 plotter 7-62
 drives, COMAL and MSD disk 3-4
 drives, copy files with two 1541 10-71
 drives, copy with two 1541 4-18

drive'type function 9-36
 drop in pipes, calculating water pressure 7-71
 "DS:" bug, SELECT 1-24
 dual drive, 1571 as 12-77
 dual drive, function keys for the MSD 9-32
 Dual drive, MSD 10-26
 dump, 1525 graphics 9-78
 dump for NEC printer, double size graphics 5-64
 dump, laser printer 10-15
 dump, MPS-801 graphics 9-78
 DUMP program bug, COLOR 11-37
 DUMP'BIG'EPSON program 4-32
 DUMP'NEC8023A program 4-32
 DUMP'PROWRITER program 4-32
 DUMPTXT1525 program 4-33
 DUPLICATE function, MSD 10-26
 dust clouds, interstellar 7-48
 Dutch error messages 8-54
 Dvorak keyboard 10-1
 dynamic keyboard substitute, COMAL 2.0 10-31
 dynamic keyboard 6-36,11-25
 Easy Curves program 10-77
 EASY SPRITES program bug 9-4
 EDIT command 1-19
 editing, full screen 1-26
 editing procedure, screen'prompt 7-70
 edition, COMAL HANDBOOK Danish 4-39
 EDITOR disk, COMAL 0.14 GRAPHICS 9-2
 editor, disk directory 3-6,8-55
 editor, font 10-1,10-30
 editor for COMAL 0.14, font 12-7
 editor for COMAL 2.0, music 6-68
 editor instructions, font 10-32
 editor instructions, graphics 11-57
 editor, Print Shop graphics 9-27
 Editor, Print Shop Icon 10-1
 editor program bug, disk 7-56
 editor program, COMAL 2.0 disk 7-56
 EDITOR program for COMAL 2.0, SONG 6-68
 editor, smooth scrolling 12-3
 editor system, graphics 11-1,11-57
 education, COMAL and 11-76
 education, COMAL in 11-69
 Education Society of Ireland, Computer 2-17
 education system, CASTLE 2-24
 Educators list, COMAL Using 7-4
 effects procedure 12-61
 effects, sprites with sound 9-64
 effects, text special 6-34
 efficient use of memory 1-5
 Eight Queens chess problem 5-11
 Electron, Acorn 11-10
 Elektronik COMAL, Dansk Data 5-6
 element of an array, first 9-27

KEYWORDS AND PHRASES

element TO fast

element of an array, last 9-27
 ELIZA artificial intelligence program 7-56
 empty printer buffer 2-28
 empty socket, cartridge 5-3,12-74
 emulate COMAL 2.0 in COMAL 0.14 3-24
 emulation : see also algorithm, function, procedure,
 program, routine, simulation
 emulator, floating point VAL 1-20
 emulator for COMAL 0.14, JOYSTICK 12-67
 emulator for COMAL 0.14, PADDLE 12-67
 emulator, logic circuit 5-39
 emulator, LOGO 1-14
 emulator procedure, PAGE 2-16
 emulator program, VT-52 terminal 2-34
 enable, RESTORE KEY 10-29
 end quote mark 1-26
 endless loop, STACK OVERFLOW from 6-66
 English font, Old 11-5
 ENHANCER program, COMAL 0.14 12-3,12-4
 ENTERing a procedure 9-6
 ENTERing programs 1-3
 entry, function key line 11-24
 entry with function key, data 11-24
 Environment, Computer Assisted Student Tutorial Learning
 2-24
 EOF usage discussion 4-51
 EPROM chip, custom 12-3
 Epson FX-80 printer code procedures 6-65,9-66
 Epson MX-80 graphics screen-dump 3-40
 Epson RX80 screen-dump package 10-72
 Epson screen-dump package 10-66
 EPYX FAST LOAD 6-70
 equation solver, differential 7-73
 equations, polar 5-50
 Eratosthenes benchmark, sieve of 5-1,12-38
 error : see also bug, conflict, correction, fix, flaw
 ERROR explained, SYNTAX 3-17
 ERROR HANDLER in COMAL 2.0 tutorial 8-48
 error message number memory location 3-7
 ERROR MESSAGES bug, CUSTOM 9-7
 error messages, COMAL 0.14 built-in 4-23
 error messages, custom 3-7,8-66
 error messages, Dutch 8-54
 error messages in COMAL 0.14, accessing 7-50
 error messages in COMAL 0.14 1-16
 error messages list, COMAL 0.14 2-21,11-82
 error messages to RAM, fast 6-43
 error messages, turn off 2-30
 error trapping tutorial 6-14
 error trapping 8-48
 errors, accessing user 3-7
 errors, correcting for rounding 9-32
 errors, fixing disk 11-16
 ERRORS program, RAM 4-23
 errors, trapping random file 6-39
 errors, trapping relative record 6-39
 escape codes to printer, sending 6-49
 ETCHASKETCH program 1-18
 Euler angle rotations 2-16
 Euler integration program 7-73
 Europe, COMAL in 2-11
 European distributor, COMAL TODAY 6-46
 EVAL procedure 10-64,10-65
 evaluator, command 10-65
 evaluator, META expression 10-64
 examining memory in the 1541 disk drive 7-59
 examining memory in the COMAL cartridge 7-59
 examining memory in the Commodore 64 7-59
 examining programs on the disk drive 7-59
 example, CLOUD'FLUX.LIST graphing program 7-48
 example program, graphics 10-47
 example, random file 10-9
 example, sprite animation 10-44
 examples, defkey 6-62
 exchange sorting 10-19
 executing batch file, automatic 12-52
 execution speed, COMAL 6-17
 EXEQ package 10-62
 exit to BASIC from COMAL 1-16,8-7,10-29
 exit to COMAL 2.0 from BASIC 6-7,10-29
 expand'comal program 5-19
 expander, APROSPAND-64 bus 6-35
 expander, CARDBOARD 5 bus 6-35
 expand'memory program bug 6-70
 expand'ram program bug 6-70
 expert systems 10-10,10-16
 explained, AMAZING ADVENTURES OF CAPTAIN COMAL 1-21
 explained, CAPTAIN COMAL SERIES 1-26
 explained, COMAL name 4-17
 explained, COMAL translator 5-12
 explained, functions 10-6
 explained, graphics screen-dump 4-30
 explained, PLOTTEXT 2-15
 explained, STACK OVERFLOW 2-15
 explained, SYNTAX ERROR 3-17
 explained, USER GROUP disks 4-12
 Express drive speed up cartridge, 1541 4-17
 expression evaluator, META 10-64
 external procedures tutorial 7-27
 external sorting 10-21
 extra memory, COMAL 0.14 5-19
 factor function, greatest common 8-40
 factorial function 8-41
 fancy'print procedure 6-34
 FAST DIRECTORY program 8-68
 fast directory reader, improved 12-50
 fast directory reading program 7-58
 fast error messages to RAM 6-43

Fast Fourier Transform bug 11-68
Fast Fourier Transform 11-67
FAST LOAD, EPYX 6-70
FAST mode, C128 12-77
FAST'BOOT BASIC program 9-43
fastload bitmap pictures 9-46
fastload for COMAL 0.14, Sizzle 9-43
fastloader, COMAL 10-41
fastloader for COMAL 0.14, COMAL QUICK 9-7
fastloader for COMAL 0.14, ML'SIZZLE 9-7,10-41
feed in PRINT statement, suppress line 5-12
FFT bug 11-68
FFT 11-67
field characters, PLOTTEXT reverse 4-27
field, clear INPUT AT 11-25
field, INPUT 6-6
file access, COMAL 2.0 6-14
file, autoexec batch 12-52
file, automatic executing batch 12-52
file bug fix, SETRECORDDELAY random 6-39
file bug, random 1-24,2-4,3-18,6-38,7-17,8-33
FILE command, OPEN 1-25
file comparison 10-70
file, COMSYMB 6-38
file conversion, graphics 11-61
file converter, Speedscript to sequential 8-56
file converter, SPRITE-MASTER image 8-46
file, copy random 6-37
file, copy relative 6-37
file creator, kelly's beach data 12-66
file, DATA statements from sprite data 12-65
file, DATA statements from sprite shape 8-45
file errors, trapping random 6-39
file example, random 10-9
file from memory, batch 10-31
file handling tips 11-25
file identification, picture 12-32
file incompatibility, COMAL 0.14/2.0 WRITE 7-51
file into 1.02 bug, 0.14 list 2-33
file, looping in a batch 8-50
file maker program, batch 7-58
file, making a batch 8-50
file name conventions 1-16,4-49,6-70,10-77,12-33
file name pattern matching 6-35
file numbers used by COMAL 7-17
file, PRG type 1-25
file printer, two column 12-12
file, recover a lost 11-24
file size finder, random 10-42
file to screen, sequential 8-43
file, TRACE list to 6-39
file transfer between C64 and IBM PC 9-12
file tutorial, batch 6-52,7-30,8-50
FILE tutorial, PRINT 2-8
FILE tutorial, WRITE 2-8
file use tutorial 12-30
file'exists function improved 6-42
file'exists function 8-48
files : see also device, directory, disk drive
files, batch 6-36
files bug, DELETE 2-28
files, closing disk 11-25
files, comparing disk 10-70
files, copying 10-70
files define function keys, batch 6-62
files, DELETED 1-23
files from RAM, batch 7-32
files in COMAL 2.0, batch 8-50
files, integer storage in WRITE 7-51
files, loading 10-40
files, mailing list program using relative 7-69
files, Master Composer music 9-22
files, open multiple 6-42
files, printing 2-24
files, running SEQ type data 5-9
files simulation routine, CREATE random 3-27
files, splat 11-25
files, sprite shape 8-21
files with two 1541 drives, copy 10-71
FILE'TO'PRINT program 2-24
fill procedure, keyboard buffer 6-42
filter procedure 4-41
FILTERTYPE procedure 5-42
FIND command for COMAL 0.14 6-61
FIND command 6-7
find last program line 7-74
finder, random file size 10-42
finding the dimensions of an array 9-27
finding the location of a string variable 4-42
finding the starting address of a string 4-43
find'radical program 7-68
FIND'STRING procedure 4-43
first element of an array 9-27
first'int function 9-27
FIRST'LAST package 9-27
first'real function 9-27
first'str function 9-27
fit, nonlinear least squares 2-16
fit'it program 6-74
fix, SETRECORDDELAY random file bug 6-39
fixing disk errors 11-16
flags, clear sprite collision 2-30
FLASH, 1541 5-39
FLASH, Skyles 1541 6-43
flipping program, sprite 5-26
floating point VAL emulator 1-20
FOCUS ON COMMODORE radio show 3-9
font : see also alphabet, character, letter, text

KEYWORDS AND PHRASES

FONT TO game

FONT Disk #01, COMAL 10-30
 FONT DISK 9-2
 font editor for COMAL 0.14 12-7
 font editor instructions 10-32
 font editor 10-1,10-30
 font in running program, LINK 10-31
 font in running program, save 10-31
 font, Old English 11-5
 font rotation 10-30
 font sprite maker program 8-44
 font.master #01 Disk directory listing 10-77
 fonts and Paperclip word processor 12-75
 fonts bug, LINKing packages, sprites, and 7-50
 fonts from a running program, loading 7-57
 fonts in COMAL 0.14 10-38
 force awkwardness method, brute 12-16
 forest program, random 8-26
 form data base program, free 12-40
 FORMAT in COMAL, disk 6-5
 FORMATTER program bug 2-21,4-51
 formatting disks 5-9
 FORTH 7-12,10-10
 FORTRAN conversion, COMAL to 4-52
 FOUNDATIONS IN COMPUTER STUDIES WITH COMAL book review
 2-7,3-41,7-40
 FOUNDATIONS IN COMPUTER STUDIES WITH COMAL Disk
 directory listing 2-20,5-60
 Fourier Transform bug, Fast 11-68
 Fourier Transform, Fast 11-67
 Fourier transform program 12-16
 fractals on 1520 plotter, three dimensional 12-26
 FRAME command 8-6,11-75
 free, checking disk blocks 10-27
 "free" COMAL disks 9-22
 FREE command 11-38
 free form data base program 12-40
 free memory in COMAL 1-5,11-74
 FREEWAY program 7-52
 full screen editing 1-26
 FUNC Disk directory listing, PROC & 5-61
 function : see also algorithm, emulation, procedure,
 program, routine, simulation
 function, Ackermann 8-41
 function as parameter 2-32
 function, BACKGROUND'COLOR 2-13
 function, BORDER'COLOR 2-13
 function, convert'base 8-35
 function, derivative of a 11-66
 function, drive'type 9-36
 function, factorial 8-41
 function, file'exists 8-48
 function, first'int 9-27
 function, first'real 9-27
 function, first'str 9-27
 function, GCD 8-40,8-41
 function, GCF 8-40
 function, get'input\$ 8-49
 function, greatest common divisor 8-40
 function, greatest common factor 8-40
 function improved, file'exists 6-42
 function, improved modem'get\$ 7-31
 function in a running program, changing a 10-64
 function, jiffies 11-38
 function, Julian date 8-47
 function key 32 character limit 7-77
 function key, data entry with 11-24
 function key definitions, long 9-33
 function key definitions, saving 9-33
 function key line entry 11-24
 function key overlay for COMAL 2.0 12-19
 function key program SAVE 7-19
 function keys, batch files define 6-62
 function keys, cartridge 6-7
 function keys, COMAL 0.14 1-13
 function keys for the MSD dual drive 9-32
 function keys in COMAL 2.0, toggling 8-33
 function keys not recursive 7-77
 function keys, redefining 7-21
 function, last'int 9-27
 function, last'real 9-27
 function, last'str 9-27
 function, LEN 9-70
 function, modem'get\$ 5-30,6-67,9-14
 function, MSD DUPLICATE 10-26
 function, PENS'COLOR 2-13
 function, ROUND 6-44
 function, sigma 9-26
 function, tempo 4-41
 function, trunc 9-32
 FUNCTIONS AND PROCEDURES book, LIBRARY OF 6-75,10-53
 FUNCTIONS AND PROCEDURES book review, COMAL LIBRARY OF
 7-35
 functions, complex hyperbolic 2-16
 functions, double precision logical 1-20
 functions explained 10-6
 functions for COMAL 2.0, modem 6-67
 functions, LOGICAL'FUNC 1-20
 functions, LOGICAL'OPS 4-18
 functions, matrix 2-16
 fun'print program 8-36
 fuzzy logic 10-17
 FX-80 printer code procedures, Epson 6-65,9-66
 (game), BOGGLE 10-2
 game bug, word 11-8
 (game), dodge'em program 4-38
 (game), dog'chases'cat program 5-32
 game, greymat 11-6
 game instructions, GUESS IT 5-52

game interest, computer bridge 9-45
game, missing letters 10-46
(game), pitfall'harry program 5-44
(game) program, kelly's beach 12-62
game program, missing letters 8-69
GAME program, WORD 8-69
game, ROD THE ROADMAN 9-58,10-2
game solution, Rod the Roadman 12-75
(game), sprite tutorial 5-31
(game), spritecollision program 5-31
Games Disk 10-1
games in COMAL, adventure 11-72
GCD function 8-40,8-41
GCF function 8-40
Gemini 10, COMAL'DUMP for 4-33
Gemini graphics screen-dump in COMAL 2.0 6-37
Gemini-10 graphics screen-dump 4-33
Gemini-10x "color" screen-dump 9-67
Gemini-10X, graphics screen-dump for 7-66,9-67
Gemini-10x screen-dump package 10-72
gemini'dump procedure 6-37
Gemini-SG10C printer 7-78
GENERATE'NEWERRS program 6-43
generator, accessing RAM under I/O and character 3-43
German COMAL Users Group 7-72
get COMAL, where to 11-75
GET\$ modem bug 5-30
GET ORGANIZED Disk directory listing 5-61
GETBACKGROUND simulation routine 3-26
GETBORDER simulation routine 3-27
GET'DRIVES procedure 10-73
get'input\$ function 8-49
GETPEN simulation routine 3-25
GETPENCOLOR simulation routine 3-25
GETS ORGANIZED book review, CAPTAIN COMAL 2-12,3-36,7-41
GETS ORGANIZED, CAPTAIN COMAL 10-61
GETS ORGANIZED Disk directory listing, CAPTAIN COMAL
2-19
"getscreen" bitmap package, graphics 10-56
GETSPRITECOLOR simulation routine 3-25
GETTURTLESIZE simulation routine 3-25
GOSUB, PROC versus 11-73
GOTO and structured programming 6-64,6-78
(graphic), COMAL 0.14 memory map 3-42
(graphic), COMAL-80 address space 5-5
graphic memory map, COMAL-80 5-5
GRAPHIC PRIMER book review 6-21
GRAPHIC PRIMER Disk directory listing 5-62
graphics : see also bitmap, drawing, picture, pixel,
screen
GRAPHICS AND SOUND book review, CARTRIDGE 7-38
graphics, bitmap 9-38
graphics bug, color 6-41
graphics characters, PLOTTEXT for 3-17
graphics chart, turtle 1-13
graphics, COMAL 0.14 10-50
graphics commands, COMAL 2.0 6-8
graphics commands 10-50
graphics conversion, BASIC to COMAL 9-38
graphics dump, 1525 9-78
graphics dump for NEC printer, double size 5-64
graphics dump, MPS-801 9-78
GRAPHICS EDITOR disk, COMAL 0.14 9-2
graphics editor instructions 11-57
graphics editor, Print Shop 9-27
graphics editor system 11-1,11-57
graphics example program 10-47
graphics file conversion 11-61
graphics "getscreen" bitmap package 10-56
graphics in COMAL 0.14, load 6-66
graphics in COMAL 0.14, save 6-66
GRAPHICS KERNAL standard 7-8
graphics, load LOGO 6-75
GRAPHICS PRIMER book review, CAPTAIN COMAL'S 7-37
graphics program, MAGIC 6-7
graphics program, pinwheel 6-45
graphics program, polar'roses 6-41
graphics program, SPIROLATERAL 4-35
graphics screen compactor 10-68
graphics screen compression 10-69
graphics screen from disk, load 3-39
graphics screen, INPUT from 2-12
graphics screen memory location 2-33,4-41
graphics screen program, save 5-27
graphics screen, reverse 5-27
graphics screen scaling 12-79
graphics screen to disk, save 3-38
graphics screen to string 10-56
graphics screen-dump, 1520 plotter 5-51
graphics screen-dump, Commodore printer 4-30
graphics screen-dump, double-size 4-32
graphics screen-dump, Epson MX-80 3-40
graphics screen-dump explained 4-30
graphics screen-dump for Gemini-10X 7-66,9-67
graphics screen-dump, Gemini-10 4-33
graphics screen-dump in COMAL 2.0, Gemini 6-37
graphics screen-dump in COMAL 3-31
graphics screen-dump, multicolor 6-41,11-56
graphics screen-dump, NEC-8023 4-32
graphics screen-dump, Okidata-92 5-18,11-56,12-20
graphics screen-dump programs 6-44
graphics screen-dump, PROWRITER-8510 4-32
graphics screen-dump 6-7
graphics screen-dumps available 4-47
graphics screens, SAVE 6-75
graphics system bug 1-23
GRAPHICS TOOLBOX disk, THE 9-2
graphics turtle image, changing 5-33

KEYWORDS AND PHRASES

graphics TO implementations

graphics tutorial, COMAL 0.14 6-55,6-56
 graphics tutorial 1-11
 GRAPHICS WITH COMAL book, C64 6-71
 GRAPHICS WITH COMAL book review, COMMODORE 64 7-39
 GRAPHICSTATE simulation routine 3-26
 graphing program bug, COMAL 0.14 7-48
 graphing program example, CLOUD'FLUX.LIST 7-48
 graphing program, GRAPHS2.L 7-48
 graphing program, least squares curve 6-74
 graphing program, LST.GRAPHS 7-48
 graphing program 7-48
 graphing tutorial 5-40
 graph'keys procedure 9-7
 graphs program, polar 5-50
 GRAPHS2.L graphing program 7-48
 graphs.l routines 5-40
 gray shades table, colors and 2-13
 greatest common divisor function 8-40
 greatest common factor function 8-40
 greymat game 11-6
 GROUP #01 Disk directory listing, USER 4-14
 GROUP #01 Disk directory listing, USER 5-58
 GROUP #02 Disk directory listing, USER 4-54
 GROUP #02 Disk directory listing, USER 5-58
 GROUP #03 Disk directory listing, USER 5-58
 GROUP #04 Disk directory listing, USER 5-59
 GROUP #05 Disk directory listing, USER 5-59
 GROUP #06 Disk directory listing, USER 5-59
 GROUP #07 Disk directory listing, USER 6-81
 GROUP #08 Disk directory listing, USER 7-79
 GROUP #09 Disk directory listing, USER 6-81
 GROUP #10 Disk directory listing, USER 9-77
 GROUP #11 Disk directory listing, USER 10-77
 GROUP disk series, USER 6-42
 GROUP disks explained, USER 4-12
 Group, German COMAL Users 7-72
 Group, Holland COMAL Users 12-3
 group information, COMAL user 5-64
 Group), SIG (Special Interest 10-48
 Group, United States Commodore Users 3-20
 groups and COMAL TODAY, user 8-64
 groups, list of COMAL user 4-15
 GUESS IT game instructions 5-52
 GUESS IT 10-16
 GUIDE, COMAL REFERENCE 6-68
 GUTENBERG lettering program 4-34
 Gutenberg 11-60,11-61
 H, control 6-41
 HAM radio code trainer 9-48
 HANDBOOK book review, COMAL 2-9,2-31,7-44
 Handbook bug, COMAL 11-37
 Handbook control location bug, COMAL 11-8
 HANDBOOK Danish edition, COMAL 4-39
 HANDBOOK Disk directory listing, COMAL 2-20,5-59
 HANDLER in COMAL 2.0 tutorial, ERROR 8-48
 handling tips, file 11-25
 hard disks, COMAL and 11-75
 (hardware), building a video detector 7-55
 (hardware), chips in the cartridge 7-55
 (hardware), COMAL cartridge design 6-27
 header convention, program 1-22,9-18
 heading, determining turtle 3-24
 HEADING simulation routine 3-24
 hexadecimal conversion 4-39
 HIDESCREEEN routine 3-26
 HINTS FOR PROGRAMMING IN COMAL booklet 5-8
 hires pictures, compacting 10-68
 history, COMAL cartridge 5-2
 Holland COMAL Users Group 12-3
 hookup, modem-modem 9-12
 HP LaserJet 10-15
 HPL language 7-13
 hrg. prefix 9-38
 .hrg suffix 10-69
 (humor), West Coast Commodore Show 6-18
 (humour), COMAL SONG 7-52
 (humour), valgol language 10-76
 hyperbolic functions, complex 2-16
 I, control 6-41
 IBM COMAL compatibility, C64 and 6-53
 IBM COMAL 5-7,11-10,11-62
 IBM PC benchmark timings 12-39
 IBM PC, file transfer between C64 and 9-12
 IBM PC, MYTECH COMAL for the 5-7,9-12
 IBM PC 11-10
 ICON disk 11-2
 Icon Editor, Print Shop 10-1
 ICONMAKER program 9-27
 ID, shifted letter in disk 4-55
 identification, picture file 12-32
 IDENTIFIERS 1-21
 IDENTIFY command 10-44
 IEEE interface, cartridge and CIE 5-35
 IEEE interface, COMAL and CIE 3-4
 IEEE interface support code, relocating CIE 3-34
 IEEE interfaces 1-26
 IEEE printer, CAT and 3-35
 IF statements, nested 10-59
 IF-THEN-ELSE tutorial 10-58
 ILLUSION bug 9-7,10-7
 ILLUSION program 8-10
 image, changing graphics turtle 5-33
 image file converter, SPRITE-MASTER 8-46
 image, turtle 1-26
 images, changing sprite 9-30
 images, sprite alphabet 4-47
 images, sprite 1-16
 implementations list, COMAL 3-13,5-6

implemented, DEBUG command not 5-16
 IMPORT command 6-11
 improved fast directory reader 12-50
 improved, file'exists function 6-42
 improved lower case PLOTTEXT in COMAL 0.14 6-54
 improved modem'get\$ function 7-31
 incompatibility, COMAL 0.14/2.0 WRITE file 7-51
 increment integer bug 4-53,6-75
 indented program LIST to disk 4-18,5-36,6-43,7-78
 indented statements 1-25
 information, COMAL user group 5-64
 information phone number 6-70
 ink blot program, RANDOM.PLOT 4-53
 INPUT AT command 6-6
 INPUT AT field, clear 11-25
 INPUT bug 1-14
 INPUT command tutorial 3-7,7-49,7-77
 INPUT command 1-24,6-36
 INPUT field 6-6
 INPUT from graphics screen 2-12
 INPUT in a running program, SELECT 9-33
 INPUT, protected 5-10,6-6,6-15
 INPUT, restart interrupted 5-25
 INPUT, two color 12-75
 inputs as A/D converters, paddle 9-34
 insert mode, turn off 5-27
 installation, safe cartridge 7-74
 installment repayment program 8-60
 instruction, computer assisted 2-24
 instructions, bitmap compression 10-69
 instructions, font editor 10-32
 instructions, graphics editor 11-57
 instructions, GUESS IT game 5-52
 instructions, seq'to'speed 11-74
 Instrutek COMAL 5-6
 INT bug 6-63
 integer bug, increment 4-53,6-75
 integer FOR loop 4-43
 integer math in COMAL 12-74
 integer storage in WRITE files 7-51
 integer variables 1-22
 integration program, Euler 7-73
 integration, trapezoid 12-16
 intelligence, artificial 10-10
 INTELLIGENCE FOR SMALL COMPUTERS book, ARTIFICIAL 7-56
 intelligence program, ELIZA artificial 7-56
 interest, computer bridge game 9-45
 Interest Group), SIG (Special 10-48
 interface and cartridge, printer 6-11
 interface, cartridge and CIE IEEE 5-35
 interface, CIE 1-26
 interface, COMAL and CARDCO +G printer 3-4
 interface, COMAL and CIE IEEE 3-4
 interface, CONNECTION printer 10-66
 interface support code, relocating CIE IEEE 3-34
 interfaces, IEEE 1-26
 interferes with SETGRAPHIC, NEW 6-42
 internal sorting 10-18
 internal structure of COMAL 4-42,5-12,5-54,8-28,9-50
 internal tables, COMAL 5-13
 INTERPOD and disk directory 2-28
 INTERPOD, cartridge and 5-35
 INTERPOD, COMAL and 3-4
 INTERPOD 1-26,2-28
 interpreter, three-pass 11-77
 INTERRUPT command 8-62
 interrupt driven alarm clock 5-38
 INTERRUPT keyword 11-18
 interrupt request procedure 8-62
 interrupted INPUT, restart 5-25
 interstellar dust clouds 7-48
 into 1.02 bug, 0.14 list file 2-33
 into COMAL 2.0, loading COMAL 0.14 programs 6-4
 introduction to COMAL 3-19
 inventory program 5-47
 I/O and character generator, accessing RAM under 3-43
 Ireland, Computer Education Society of 2-17
 irq'proc procedure 8-63
 IT" key, "SAVE 11-55
 jiffies function 11-38
 joy'cursor program 7-77
 joystick : see also lightpen, paddle, port
 JOYSTICK bug 6-5
 joystick, cursor for 7-77
 joystick drawing program 1-18
 JOYSTICK emulator for COMAL 0.14 12-67
 joystick ports as A/D converters 9-34
 JOYSTICK routine 4-39
 Julian date function 8-47
 Julian day 9-76
 kelly's beach data file creator 12-66
 kelly's beach (game) program 12-62
 kelly's beach program listing 12-68
 kernal, COMAL 1-26,3-3,4-55,6-53
 KERNAL standard, GRAPHICS 7-8
 key 32 character limit, function 7-77
 key, data entry with function 11-24
 key definitions, long function 9-33
 key definitions, saving function 9-33
 key, delete 7-19
 key disable, RESTORE 7-78,10-29
 key display codes 9-22
 KEY enable, RESTORE 10-29
 key in COMAL 2.0, control U 8-33
 key line entry, function 11-24
 key overlay for COMAL 2.0, function 12-19
 key, POP 11-18
 key program SAVE, function 7-19

KEYWORDS AND PHRASES

key TO lines

key, "SAVE IT" 11-55
 key tutorial, STOP 3-7
 key values, cartridge control 6-7,6-34,11-14
 keyboard buffer, clearing the 5-47
 keyboard buffer fill procedure 6-42
 keyboard buffer mystery 11-25
 keyboard buffer 12-45
 keyboard, Dvorak 10-1
 keyboard, dynamic 6-36,11-25
 keyboard repeat 10-29
 keyboard substitute, COMAL 2.0 dynamic 10-31
 keypad program, numeric 6-16
 KEYPAD64 program 6-16
 keys, batch files define function 6-62
 keys, cartridge function 6-7
 keys, COMAL 0.14 function 1-13
 keys for the MSD dual drive, function 9-32
 keys in COMAL 2.0, toggling function 8-33
 keys not recursive, function 7-77
 keys, redefining function 7-21
 keyword comparison, COMAL 2.0 and 0.14 6-12
 keyword, INTERRUPT 11-18
 keyword list, COMAL 2.0 packages 12-54
 keyword list, COMAL 11-30
 keyword, PI 6-7
 keyword substitutions 2-23
 keyword table memory location, COMAL 5-16
 keywords, COMAL 2.0 11-30
 keywords, listing COMAL 0.14 3-42
 keywords, optional 2-23
 kilroy program 10-55
 KIT review, COMAL STARTER 6-44
 KOALA pad 1-19
 KOALA procedure bug 6-63
 KOALA'DEMO program 1-19
 Kwik loading COMAL 0.14 7-25
 KWIK-LOAD boot program 7-25
 label for COMAL 0.14, RESTORE to 6-71
 language and COMAL, machine 1-22,12-79
 language clock program, machine 5-26
 language, DATA statements from machine 6-36
 language, HPL 7-13
 language (humour), valgol 10-76
 language in a string variable, storing machine 4-42
 language, load machine 3-37
 language monitor, machine 10-74
 language monitors, COMAL machine 12-48
 language program, sign 5-33
 language review, PROMAL 5-37
 language routines as packages, machine 10-62
 languages, benchmarks for seventeen 12-37
 large letter program 7-26
 laser printer dump 10-15
 LaserJet, HP 10-15
 last element of an array 9-27
 last program line, find 7-74
 last'int function 9-27
 last'real function 9-27
 last'str function 9-27
 learning COMAL 2-10,3-11,3-13
 Learning Environment, Computer Assisted Student Tutorial 2-24
 least squares curve graphing program 6-74
 least squares fit, nonlinear 2-16
 LEGO Robot 8-1
 LEN function 9-70
 lessons on video tape 12-24
 lessons, vcr 11-76
 lessons, videocassette 11-76
 letter from AHoy! magazine 12-72
 letter in disk ID, shifted 4-55
 letter program, big 1-17
 letter program, large 7-26
 lettering program, GUTENBERG 4-34
 letters game, missing 10-46
 letters game program, missing 8-69
 letters program, shadow 6-34
 LIBRARIAN program 6-76
 LIBRARY book/disk, PACKAGES 12-3
 library data base, disk 6-50
 LIBRARY OF FUNCTIONS AND PROCEDURES book review, COMAL 7-35
 LIBRARY OF FUNCTIONS AND PROCEDURES book 6-75,10-53
 LIBRARY, PACKAGES 10-2
 license to sell COMAL 1-23
 light pen, McPen 1-19,5-55
 light pen, Tech Sketch 7-78
 light pen tutorial for COMAL 2.0 5-55
 lightpen : see also joystick, paddle, port
 LIGHTPEN default OFFSET values 6-38
 lightpen DELAY time units 6-38
 lightpen TIMEON time units 6-38
 limacon curve 5-50
 limit, function key 32 character 7-77
 limitations, COMAL memory 1-5
 limits, name table 1-21
 Lincoln College Commodore Computer Camp 7-29,8-1
 line, drawing a 10-51
 line entry, function key 11-24
 line feed in PRINT statement, suppress 5-12
 line, find last program 7-74
 line numbering, AUTO 5-10
 line numbers 1-26,9-5
 line, spaces in program 1-26
 LINEFEED command 3-10,9-5
 lines, deleting program 11-73
 lines, drawing curved 10-53
 lines, spaces in program 6-63

LINK, C64 1-22,1-26,2-6
 LINK font in running program 10-31
 Link network, Quantum 9-1
 LINK 10-11
 "linkage" program 2-10
 LINK'IN'FONT 10-31
 LINKing packages, sprites, and fonts bug 7-50
 LINKing sprite shapes 5-5
 LINK'IN'META 10-65
 LINKSHAPE command tutorial 5-5
 LISP 10-10
 list, COMAL 0.14 error messages 2-21,11-82
 list, COMAL 2.0 packages keyword 12-54
 list, COMAL bulletin board 5-36
 list, COMAL implementations 3-13,5-6
 list, COMAL keyword 11-30
 list, COMAL school price 9-9
 list, COMAL teachers 9-4
 list, COMAL token 5-15
 list, COMAL Using Educators 7-4
 LIST command 1-25
 list file into 1.02 bug, 0.14 2-33
 list for COMAL 0.14, token 6-76
 LIST in upper and lower case 3-35,9-6,10-6
 list of 1063 COMAL programs 5-11
 list of COMAL user groups 4-15
 list program using relative files, mailing 7-69
 LIST to 1520 plotter 3-35,10-29
 LIST to 1525 printer 3-35
 LIST to disk, indented program 4-18,5-36,6-43,7-78
 LIST to disk 6-10
 list to file, TRACE 6-39
 list to printer, TRACE 6-39
 list, two column directory 6-43
 listing, 2.0 PACKAGES Disk directory 7-79
 listing a disk directory to a printer 9-6
 listing, AUTO RUN DEMO Disk directory 5-62
 listing, BEGINNING COMAL Disk directory 2-18,5-60
 listing, BEST OF COMAL Disk directory 6-81
 listing, BRICKS TUTORIAL Disk directory 6-81
 listing bug, BIGLETTER/DEMO program 2-21
 listing, CAPTAIN COMAL GETS ORGANIZED Disk directory 2-19
 listing, CARTRIDGE DEMO Disk #01 directory 5-63
 listing, CARTRIDGE DEMO Disk #02 directory 5-63
 listing, CARTRIDGE DEMO Disk #03 directory 5-64
 listing, CARTRIDGE DEMO Disk #04 directory 5-64
 listing COMAL 0.14 keywords 3-42
 listing, COMAL 0.14 mixed case program 5-22
 listing, COMAL 0.14 SYSTEM Disk directory 2-18
 listing, COMAL HANDBOOK Disk directory 2-20,5-59
 listing, DIRECT'CON program 9-14
 listing, font.master #01 Disk directory 10-77
 listing, FOUNDATIONS IN COMPUTER STUDIES WITH COMAL Disk directory 2-20,5-60
 listing, GET ORGANIZED Disk directory 5-61
 listing, GRAPHIC PRIMER Disk directory 5-62
 listing, kelly's beach program 12-68
 listing, MODEM Disk directory 7-79
 listing pause for COMAL 0.14, CAT 5-31
 listing, PET COMAL DISK directory 2-19
 listing, PROC & FUNC Disk directory 5-61
 listing programs 5-9
 listing, SAMPLER DISK directory 5-62
 listing, SLIDE SHOW #01 Disk directory 5-62
 listing, SLIDE SHOW #02 Disk directory 5-62
 listing, STRUCTURED PROGRAMMING WITH COMAL Disk directory 2-19,5-60
 listing, TODAY #01 Disk directory 2-18
 listing, TODAY #01 Disk directory 5-57
 listing, TODAY #02 Disk directory 5-57
 listing, TODAY #03 Disk directory 4-54
 listing, TODAY #03 Disk directory 5-57
 listing, TODAY #04 Disk directory 5-57
 listing, TODAY #05 Disk directory 5-58
 listing, TODAY #06 Disk directory 6-81
 listing, TODAY #07 Disk directory 7-79
 listing, TODAY #08 Disk directory 8-77
 listing, TODAY #09 Disk directory 9-77
 listing, TODAY #11 Disk directory 12-78
 listing, TUTORIAL Disk directory 4-54,5-62
 listing, USER GROUP #01 Disk directory 4-14
 listing, USER GROUP #01 Disk directory 5-58
 listing, USER GROUP #02 Disk directory 4-54
 listing, USER GROUP #02 Disk directory 5-58
 listing, USER GROUP #03 Disk directory 5-58
 listing, USER GROUP #04 Disk directory 5-59
 listing, USER GROUP #05 Disk directory 5-59
 listing, USER GROUP #06 Disk directory 5-59
 listing, USER GROUP #07 Disk directory 6-81
 listing, USER GROUP #08 Disk directory 7-79
 listing, USER GROUP #09 Disk directory 6-81
 listing, USER GROUP #10 Disk directory 9-77
 listing, USER GROUP #11 Disk directory 10-77
 listing, UTILITY Disk #02 directory 9-77
 listings, paste-on directory 11-40
 live menu 11-5
 load address, package 10-29
 LOAD bug in COMAL 0.14 6-44
 LOAD check, BASIC/COMAL 6-44
 LOAD command bug 7-50
 LOAD, EPYX FAST 6-70
 load graphics in COMAL 0.14 6-66
 load graphics screen from disk 3-39
 load LOGO graphics 6-75
 load machine code from disk 6-82
 load machine language 3-37
 load'bitmap procedure, 9-39

KEYWORDS AND PHRASES

LOAD'GRAPHICS'SCREEN TO memory

LOAD'GRAPHICS'SCREEN procedure 3-39
 loading COMAL 0.14, Kwik 7-25
 loading COMAL 0.14 programs into COMAL 2.0 6-4
 loading COMAL 0.14 with TURBODISK 9-7
 loading COMAL from BASIC 1-4
 loading files 10-40
 loading fonts from a running program 7-57
 load'obj procedure 6-82
 load'obj procedure 9-41
 LOADSCREEN for COMAL 0.14 6-66
 LOADSHAPE command tutorial 5-5
 loadshape procedure, sprite 8-14
 loan payments program 12-19
 location bug, COMAL Handbook control 11-8
 location, COMAL keyword table memory 5-16
 location, error message number memory 3-7
 location, graphics screen memory 2-33,4-41
 location of a string variable, finding the 4-42
 location, program output memory 9-18
 location, text screen memory 2-33
 locations, C64 versus PET memory 1-2
 locations, COMAL 0.14 memory 5-19
 locations in COMAL 2.0, sprite memory 6-41
 locations in COMAL, memory 3-10
 locations, sprite memory 2-17
 lock, case mode 4-37,6-41,7-78
 log, auto disk 6-72
 log program, computer 6-72
 logarithmic axes 7-48
 logic circuit emulator 5-39
 logic, fuzzy 10-17
 logical functions, double precision 1-20
 LOGICAL'FUNC functions 1-20
 LOGICAL'OPS functions 4-18
 LOGO emulator 1-14
 LOGO graphics, load 6-75
 long function key definitions 9-33
 loop, integer FOR 4-43
 loop, STACK OVERFLOW from endless 6-66
 looping in a batch file 8-50
 Los Angeles area, COMAL in 4-47
 lost file, recover a 11-24
 lower case characters, PLOTTEXT for 3-17
 lower case, LIST in upper and 3-35,9-6,10-6
 lower case PLOTTEXT in COMAL 0.14, improved 6-54
 lower case PLOTTEXT in COMAL 0.14 6-43
 lower case printing 2-28
 "LP:" and CAT bug, SELECT 1-25
 "LP:" for any device, SELECT 3-35
 lp'condense program bug 5-23
 LST.GRAPHs graphing program 7-48
 machine code from disk, load 6-82
 machine code to DATA statements, convert 7-60
 machine language : see also assembler, monitor, package

machine language and COMAL 1-22,12-79
 machine language clock program 5-26
 machine language, DATA statements from 6-36
 machine language in a string variable, storing 4-42
 machine language, load 3-37
 machine language monitor 10-74
 machine language monitors, COMAL 12-48
 machine language routines as packages 10-62
 MAGAZINE article corrections, COMMODORE 1-3
 magazine disks, AHOY! 12-2
 magazine, letter from AHOY! 12-72
 MAGIC graphics program 6-7
 mailing list program using relative files 7-69
 make'data program 8-45
 make'data'stmts program 7-60
 MAKE'OBJECT'FILE bug 9-7
 make'object'file program 7-61
 maker program, batch file 7-58
 maker program, font sprite 8-44
 maker, PROG'RAM package 9-73
 maker tutorial, PROG'RAM package 9-73
 making a batch file 8-50
 manager in COMAL 0.14, data base 6-47
 map, COMAL 0.14 memory 2-5,3-22,4-19,6-28
 map, COMAL 2.0 cartridge memory 6-22
 map, COMAL memory 11-73
 map, COMAL-80 graphic memory 5-5
 map comment, COMAL memory 5-54
 map (graphic), COMAL 0.14 memory 3-42
 MARCA Computer Show 8-1
 mark, end quote 1-26
 MASTER, Access Software SPRITE 8-46
 Master Composer music files 9-22
 master disks 9-28
 matching algorithm, soundex approximate string 8-22
 matching, file name pattern 6-35
 matching, pattern 10-28
 MATH AND SCIENCE disk 9-2
 math in COMAL, integer 12-74
 matrix functions 2-16
 McPen light pen 1-19,5-55
 mean : see also average
 mean of an array 9-26
 mean square of an array, root 9-26
 meaningful names in COMAL 8-24
 measuring device, paddle ports as a 9-34
 meeting, COMAL-80 standardization 2-17
 meeting of April 1984, COMAL standardization 3-3
 memory available in COMAL 11-74
 memory, batch file from 10-31
 memory, checking remaining 11-38
 memory, COMAL 0.14 extra 5-19
 memory, efficient use of 1-5
 memory in COMAL 0.14, safe 2-33,4-18

memory in COMAL 2.0, accessing sprite 6-41
memory in COMAL, free 1-5,11-74
memory in the 1541 disk drive, examining 7-59
memory in the COMAL cartridge, examining 7-59
memory in the Commodore 64, examining 7-59
memory limitations, COMAL 1-5
memory location, COMAL keyword table 5-16
memory location, error message number 3-7
memory location, graphics screen 2-33,4-41
memory location, program output 9-18
memory location, text screen 2-33
memory locations, C64 versus PET 1-2
memory locations, COMAL 0.14 5-19
memory locations in COMAL 2.0, sprite 6-41
memory locations in COMAL 3-10
memory locations, sprite 2-17
memory map, COMAL 0.14 2-5,3-22,4-19,6-28
memory map, COMAL 2.0 cartridge 6-22
memory map, COMAL 11-73
memory map, COMAL-80 graphic 5-5
memory map comment, COMAL 5-54
memory map (graphic), COMAL 0.14 3-42
memory to disk, save 3-37
memory usage, COMAL 0.14 2-34
memory, virtual 5-36
menu, live 11-5
menu system, POPOVER 11-1,11-18
menu window program 11-18
menus in BBS programs 11-5
MERGE command 6-9
message number memory location, error 3-7
MESSAGES bug, CUSTOM ERROR 9-7
messages, COMAL 0.14 built-in error 4-23
messages, custom error 3-7,8-66
messages, Dutch error 8-54
messages in COMAL 0.14, accessing error 7-50
messages in COMAL 0.14, error 1-16
messages list, COMAL 0.14 error 2-21,11-82
messages, spice up printed 8-36
messages to RAM, fast error 6-43
messages, turn off error 2-30
META expression evaluator 10-64
META package, restrictions on 10-65
META package 10-64,10-65
METAMORPHOSE sprite procedure 9-30
Metanic APS COMAL 5-6
method, brute force awkwardness 12-16
Micro A, BBC 11-10
Micro B, BBC 11-10
MICROSCRIBBLE program bug 2-21
MICROSCRIBBLE program 1-18
Microvox speech synthesizer 4-47
microworld 12-62
missing letters game program 8-69
missing letters game 10-46
mix program, color 5-20
mixed case program listing, COMAL 0.14 5-22
ml'procs program 5-29
ml'setup program 5-26,5-27
ML'SIZZLE fastloader for COMAL 0.14 9-7,10-41
ml'string/demo program 4-42
MOD command 10-44
mode, AUTO 6-9
mode, C128 FAST 12-77
mode lock, case 4-37,6-41,7-78
mode, quote 6-49
mode, switch 1571 to 1541 drive 12-77
mode, switching case 7-78
mode, turn off insert 5-27
mode, turn off quote 5-27
mode unlock, case 6-41
modem bug, GET\$ 5-30
modem, control C64 by 12-75
MODEM Disk directory listing 7-79
modem functions for COMAL 2.0 6-67
modem procedures for COMAL 2.0 6-67
modem program 2-34
modem!get\$ function, improved 7-31
modem!get\$ function 5-30,6-67,9-14
modem-modem hookup 9-12
modems and COMAL 2.0 9-10
modified ASCII Commodore codes 7-78
modifying data statements 10-17
modifying default screen colors 10-29
molecule program, three dimensional 6-32
monitor : see also assembler, machine language, package
monitor from COMAL, BUSCARD 7-33
monitor, machine language 10-74
Monitor Package 10-1
monitors, COMAL machine language 12-48
mortgage repayment program 8-60
MOUNT command 10-28
MOUNT simulation routine 3-28
MOVESPRITE 10-24
MPS-801 graphics dump 9-78
MSD disk drives, COMAL and 3-4
MSD dual drive, function keys for the 9-32
MSD Dual drive 10-26
MSD DUPLICATE function 10-26
MSX BASIC 5-7
multicolor graphics screen-dump 6-41,11-56
MULTI-LINK, COMAL and 3-4
MULTI-LINK networking cartridge, RTC 3-29
multiple files, open 6-42
music : see also SID, sound
music editor for COMAL 2.0 6-68
music files, Master Composer 9-22
music routines for COMAL 0.14 8-34

KEYWORDS AND PHRASES

music'all/demo TO PACKAGE

music'all/demo program 4-40
 music'compiler program 8-30
 music'time procedure 4-40
 MX-80 graphics screen-dump, Epson 3-40
 mystery, keyboard buffer 11-25
 MYTECH COMAL for the IBM PC 5-7,9-12
 name, apostrophe in variable 2-12
 name convention, program 1-22
 name conventions, file 1-16,4-49,6-70,10-77,12-33
 name explained, COMAL 4-17
 name pattern matching, file 6-35
 name table, COMAL 0.14 4-42
 name table, COMAL 5-14
 name table, displaying a program 5-46
 name table limits 1-21
 name table, showing the COMAL 2.0 9-68
 names, characters permitted in variable 2-12
 names in COMAL 2.0, reserved 6-38
 names in COMAL, meaningful 8-24
 NEC printer, double size graphics dump for 5-64
 NEC-8023 graphics screen-dump 4-32
 nested IF statements 10-59
 nesting procedures 10-6
 Netherlands, COMAL in the 3-5
 network and COMAL, PlayNET 6-46,9-1,9-36
 network, COMPUSERVE 2-26,9-1
 network, Delphi 9-1
 network, People-Link 9-1,9-57
 network, Quantum Link 9-1
 networking cartridge, RTC MULTI-LINK 3-29
 NEW interferes with SETGRAPHIC 6-42
 nmi-alarm program 5-38
 non-Commodore to Commodore assembler, convert 7-61
 nonlinear least squares fit 2-16
 not implemented, DEBUG command 5-16
 not on disk, COMAL 2.0 4-18,6-39
 not recursive, function keys 7-77
 notation, reverse Polish 5-12
 number, changing disk drive device 8-43,10-42
 number data base program, telephone 10-45
 number in 0.14 DIR command, device 10-28
 number, information phone 6-70
 number memory location, error message 3-7
 number procedure, STRING from 2-7
 number, program version 11-55
 number, specifying drive 12-46
 numbering, AUTO line 5-10
 numbers, COMAL 2.0 device 6-11
 numbers in COMAL 2.0, device 6-36
 numbers, line 1-26,9-5
 numbers, prime 4-45
 numbers to words, converting 10-12
 numbers used by COMAL, file 7-17
 numeric keypad program 6-16
 num-string/demo program 4-49
 OBJ'LOAD procedure 3-37
 OBJ'SAVE procedure 3-37
 off error messages, turn 2-30
 off insert mode, turn 5-27
 off quote mode, turn 5-27
 offer, SCHOOL COMAL PACKAGE 9-9
 offset parameter bug, PRINTSCREEN 6-38
 OFFSET values, LIGHTPEN default 6-38
 OKI92'TEST bug 10-7
 Okidata-92 graphics screen-dump 5-18,11-56,12-20
 Okidata-93a screen-dump package 10-72
 Old English font 11-5
 ON/GOTO, CASE and 11-72
 opcodes, undocumented 12-49
 OPEN command tutorial 4-51
 OPEN FILE command 1-25
 open multiple files 6-42
 opening COMAL cartridge 6-35
 optional keywords 2-23
 ORD, ASC and 11-72
 order of disk directory 1-23
 ORGANIZED book review, CAPTAIN COMAL GETS 2-12,3-36,7-41
 ORGANIZED, CAPTAIN COMAL GETS 10-61
 ORGANIZED Disk directory listing, CAPTAIN COMAL GETS
 2-19
 ORGANIZED Disk directory listing, GET 5-61
 origins, COMAL 1-8,2-11
 other programs, cartridge compatibility with 6-38
 output memory location, program 9-18
 output to printer 12-74
 OVERFLOW explained, STACK 2-15
 OVERFLOW from endless loop, STACK 6-66
 overlay for COMAL 2.0, function key 12-19
 overlays 5-36
 P print text screen, control 5-28,7-57
 p.32) correction, Batch-Files-From-Memory (CT#7, 12-6
 package : see also assembler, machine language, monitor
 package 1541 drive speedup, RABBIT 12-5
 package, bitmap 10-56
 package, converting a program to a 9-73
 package, de-LINKing a 11-65
 package, Epson RX80 screen-dump 10-72
 package, Epson screen-dump 10-66
 package, EXEQ 10-62
 package, FIRST'LAST 9-27
 package, Gemini-10x screen-dump 10-72
 package, graphics "getscreen" bitmap 10-56
 package load address 10-29
 package maker, PROG'RAM 9-73
 package maker tutorial, PROG'RAM 9-73
 package, META 10-64,10-65
 Package, Monitor 10-1
 PACKAGE offer, SCHOOL COMAL 9-9

package, Okidata-93a screen-dump 10-72
package program, BASIC 8-75
package, restrictions on META 10-65
package, ROMMED 10-65
package, text 11-63
PACKAGE tutorial 6-69
Packages book, COMAL 2.0 10-67
PACKAGES book review, COMAL 2.0 6-40,7-35
PACKAGES Disk directory listing, 2.0 7-79
packages keyword list, COMAL 2.0 12-54
PACKAGES LIBRARY book/disk 12-3
PACKAGES LIBRARY 10-2
packages, machine language routines as 10-62
packages, sprites, and fonts bug, LINKing 7-50
PACKAGES 10-2,10-11
pad, KOALA 1-19
pad spaces in string 5-23
paddle : see also joystick, lightpen, port
PADDLE bug 6-5
paddle control 1-18
PADDLE emulator for COMAL 0.14 12-67
paddle inputs as A/D converters 9-34
paddle ports as a measuring device 9-34
PADDLE routine 4-39
PAGE emulator procedure 2-16
PAGE simulation routine 3-27
page-32 bug, COMAL TODAY #02 4-39
Paperclip word processor, fonts and 12-75
parameter, array as 6-11,6-39
parameter bug, PRINTSCREEN offset 6-38
parameter, function as 2-32
parameter tutorial, array as 4-48
parameter tutorial 2-32
Pascal, COMAL versus 3-20
PASS command tutorial 5-8,10-26
PASS to disk drive unit 9 6-11,6-37
paste-on directory listings 11-40
pattern matching, file name 6-35
pattern matching 10-28
pause for COMAL 0.14, CAT listing 5-31
payments program, loan 12-19
PC benchmark timings, IBM 12-39
PC, file transfer between C64 and IBM 9-12
PC, IBM 11-10
PC, MYTECH COMAL for the IBM 5-7,9-12
PEEK value, character 2-31
pen color, determining 3-25
pen, McPen light 1-19,5-55
pen state, determining 3-25
pen, Tech Sketch light 7-78
pen tutorial for COMAL 2.0, light 5-55
pencolor 10-52
PENS'COLOR function 2-13
PENTAGRAM procedure 2-33

People-Link network 9-1,9-57
perform'string procedure 7-33
peripheral device power requirements 12-76
permitted in variable names, characters 2-12
PET COMAL DISK directory listing 2-19
PET memory locations, C64 versus 1-2
phone number, information 6-70
PI keyword 6-7
picfinder program 12-32
Picture Compactor 10-1
picture compression system 10-61
picture file identification 12-32
picture system, compacted 11-61
pictures, compacting hires 10-68
pictures, Doodle 11-61
pictures, fastload bitmap 9-46
pie chart 3-5
PILOT 11-69
pinwheel graphics program 6-45
pipes, calculating water pressure drop in 7-71
pitfall'harry program (game) 5-44
pixel'dump program 4-33
pkg.bitmap 10-56
pkg.cmon 10-74
pkg.compactor 10-68,10-69
pkg.dutch'errors 8-54
pkg.eps'grph9000 10-66
pkg.exeq 10-64
pkg.finchutil 10-72
pkg.first'last 9-27
pkg.meta 10-65
pkg.new'errors 9-7
PKG.ROTATE 10-30
plain COMAL cartridge 6-38
play procedure 4-40
PlayNET network and COMAL 6-46,9-1,9-36
PLOT command 10-51
PLOT'CHAR routine 3-17
plotter driver procedures, 1520 7-62
plotter graphics screen-dump, 1520 5-51
plotter, LIST to 1520 3-35,10-29
plotter print'screen procedure, 1520 5-51
plotter procedures, 1520 9-48
plotter, three dimensional fractals on 1520 12-26
PLOTTEXT explained 2-15
PLOTTEXT for graphics characters 3-17
PLOTTEXT for lower case characters 3-17
PLOTTEXT for reverse characters 3-17
PLOTTEXT in COMAL 0.14, improved lower case 6-54
PLOTTEXT in COMAL 0.14, lower case 6-43
PLOTTEXT reverse field characters 4-27
point VAL emulator, floating 1-20
POKE character to screen 2-31
polar equations 5-50

KEYWORDS AND PHRASES

polar TO procedure

polar graphs program 5-50
 polar'roses graphics program 6-41
 Polish notation, reverse 5-12
 POLYGON routine 3-26
 polygons, drawing 10-51,10-53
 polygons program 7-67
 POP key 11-18
 POPOVER menu system 11-1,11-18
 port : see also joystick, lightpen, paddle
 ports as a measuring device, paddle 9-34
 ports as A/D converters, joystick 9-34
 position, determining cursor 3-27
 positioning, cursor 3-27
 power requirements, peripheral device 12-76
 power spectrum 11-67
 power supply problems 6-35
 power supply ratings 12-76
 precision logical functions, double 1-20
 prefix, hrg. 9-38
 pressure drop in pipes, calculating water 7-71
 PRG type file 1-25
 price list, COMAL school 9-9
 prime numbers 4-45
 PRIMER book review, CAPTAIN COMAL'S GRAPHICS 7-37
 PRIMER book review, GRAPHIC 6-21
 PRIMER Disk directory listing, GRAPHIC 5-62
 PRINT abbreviation 1-22
 PRINT command tutorial 4-50
 PRINT FILE tutorial 2-8
 print program, sideways 12-10
 Print Shop graphics editor 9-27
 Print Shop Icon Editor 10-1
 print statement, comma in 5-12
 PRINT statement, suppress line feed in 5-12
 print text screen, control P 5-28,7-57
 PRINT USING command 1-24
 PRINT USING tutorial 2-28
 printed messages, spice up 8-36
 printer buffer, empty 2-28
 printer, CAT and IEEE 3-35
 printer code procedures, Epson FX-80 6-65,9-66
 printer control codes, SELECT and 2-28
 printer control program, 8023P 2-29
 printer, double size graphics dump for NEC 5-64
 printer dump, laser 10-15
 printer, Gemini-SG10C 7-78
 printer graphics screen-dump, Commodore 4-30
 printer interface and cartridge 6-11
 printer interface, COMAL and CARDCO +G 3-4
 printer interface, CONNECTION 10-66
 printer, LIST to 1525 3-35
 printer, listing a disk directory to a 9-6
 printer, output to 12-74
 printer secondary address, accessing 6-49
 printer secondary address 1-24
 printer, sending escape codes to 6-49
 printer, TRACE list to 6-39
 printer, two column file 12-12
 printing files 2-24
 printing, lower case 2-28
 PRINTSCREEN offset parameter bug 6-38
 print'screen procedure, 1520 plotter 5-51
 Prize, Borge Christensen Annual 11-71
 prnt'lrq'chars program 7-26
 problem, Eight Queens chess 5-11
 problems, power supply 6-35
 PROC & FUNC Disk directory listing 5-61
 PROC versus GOSUB 11-73
 procedure : see also algorithm, emulation, function,
 program, routine, simulation
 procedure, 1520 plotter print'screen 5-51
 procedure, adsr 4-41
 procedure, AGAIN 10-65
 procedure, alarm sound 8-35
 procedure, base'conv 5-43
 procedure bug, KOALA 6-63
 procedure bug, put'char 5-42
 procedure, change'dev 8-43
 procedure, CLEAR'COLLISIONS 2-30
 procedure, clear'keys 5-47
 procedure, CONVERT 2-6,12-22
 procedure, COPY'FILE 10-70
 procedure, DAC 10-12
 procedure, directory 8-68
 procedure, effects 12-61
 procedure, ENTERing a 9-6
 procedure, EVAL 10-64,10-65
 procedure, fancy'print 6-34
 procedure, filter 4-41
 procedure, FILTERTYPE 5-42
 procedure, FIND'String 4-43
 procedure, gemini'dump 6-37
 procedure, GET'DRIVES 10-73
 procedure, graph'keys 9-7
 procedure, interrupt request 8-62
 procedure, irq'proc 8-63
 procedure, keyboard buffer fill 6-42
 procedure, load'bitmap 9-39
 procedure, LOAD'GRAPHICS'SCREEN 3-39
 procedure, load'obj 6-82
 procedure, load'obj 9-41
 procedure, METAMORPHOSE sprite 9-30
 procedure, music'time 4-40
 procedure, OBJ'LOAD 3-37
 procedure, OBJ'SAVE 3-37
 procedure, PAGE emulator 2-16
 procedure, PENTAGRAM 2-33
 procedure, perform'string 7-33

procedure, play 4-40
 procedure, PROC.SHOWNAMES 9-58
 procedure, PUT'CHAR 2-31
 procedure, read'dir 12-50
 procedure, repeat'keys 6-43
 procedure, REVEAL 9-58,10-1,10-2
 procedure, SAVE'GRAPHICS'SCREEN 3-38
 procedure, SCREEN'CHAR 2-31
 procedure, screen'prompt editing 7-70
 procedure, scroll'down 8-59
 procedure, siren sound 8-35
 procedure, sprite loadshape 8-14
 procedure, sprite saveshape 8-21
 procedure, STR\$ simulation 2-6,2-7,3-28,4-49,5-43
 procedure, STRING from number 2-7
 procedure, TEST'SIGNAL 5-42
 procedure, toggle'graph'keys 8-33
 PROCEDURE tutorial 7-16
 procedure, type 8-43
 procedure, VAL simulation 2-6
 procedure, volume 4-41
 procedure, waveform 4-41
 procedure, window'down 8-59
 procedure, window'up 8-59
 procedures, 1520 plotter driver 7-62
 procedures, 1520 plotter 9-48
 PROCEDURES book, LIBRARY OF FUNCTIONS AND 6-75,10-53
 PROCEDURES book review, COMAL LIBRARY OF FUNCTIONS AND 7-35
 procedures, Cardco +G/printer 9-66
 procedures, Cardprint +G/printer 9-66
 procedures, Epson FX-80 printer code 6-65,9-66
 procedures for COMAL 2.0, modem 6-67
 procedures, nesting 10-6
 procedures tutorial, external 7-27
 processing, aliasing in signal 5-42
 processor, fonts and Paperclip word 12-75
 PROC.SHOWNAMES procedure 9-58
 program : see also algorithm, emulation, function,
 procedure, routine, simulation
 program, 127 colors 5-20
 program, 1541 drive alignment 9-34
 program, 3d'fractals 12-26
 program, 8023P printer control 2-29
 program, 8023P'OPTIONS 2-29
 program, all'at'once 5-4
 program, AUTOMATIC DATA 4-17
 program, BASIC package 8-75
 program, batch file maker 7-58
 program, batchfile'maker 7-59
 program, big letter 1-17
 program, BIG'LETTER 1-17
 program, bit'map'print 3-32
 program bug, all'at'once2 5-4
 program bug, cartridge checking 7-72
 program bug, CHECK'CARTRIDGE 7-72
 program bug, COLOR DUMP 11-37
 program bug, COMAL 0.14 graphing 7-48
 program bug, DAY'OF'WEEK 6-63
 program bug, disk editor 7-56
 program bug, EASY SPRITES 9-4
 program bug, expand'memory 6-70
 program bug, expand'ram 6-70
 program bug, FORMATTER 2-21,4-51
 program bug, lp'condense 5-23
 program bug, MICROSCRIBBLE 2-21
 program bug, savescreen 5-37
 program bug, SPRITE'DESIGNER 2-21
 program, changing a function in a running 10-64
 program, "check cartridge" 8-6
 program, circular clock 4-29
 program, color mix 5-20
 program, COMAL 0.14 ENHANCER 12-3,12-4
 program, COMAL 2.0 disk editor 7-56
 program, COMAL cartridge checking 6-40
 program, comal'keypad.14 6-17
 program, comal'keypad'2.0 6-16
 program, complex radical 7-68
 program, computer log 6-72
 program, correct'disk 11-16
 program, correlator 5-40
 program, data base 8-25,11-72
 program, depreciation schedule 8-52
 program, digital clock demo 5-20
 program, direct reduction repayment 8-60
 program, DIRECT'CON communications 9-12
 program, dir'list 9-6
 program, disassembler 7-59
 program, disk backup 10-60
 program, disk'editor 5-45
 program, DOUBLER 12-12
 program, drawing 10-43
 program, draw'molecules 6-32
 program, DUMP'BIG'EPSON 4-32
 program, DUMP'NEC8023A 4-32
 program, DUMP'PROWRITER 4-32
 program, DUMPTXT1525 4-33
 program, Easy Curves 10-77
 program, ELIZA artificial intelligence 7-56
 program, ETCHASKETCH 1-18
 program, Euler integration 7-73
 program example, CLOUD'FLUX.LIST graphing 7-48
 program, expand'comal 5-19
 program, fast directory reading 7-58
 program, FAST DIRECTORY 8-68
 program, FAST'BOOT BASIC 9-43
 program, FILE'TO'PRINT 2-24
 program, find'radical 7-68

KEYWORDS AND PHRASES

program TO program

program, fit'it 6-74
 program, font sprite maker 8-44
 program for COMAL 2.0, SONG EDITOR 6-68
 program, Fourier transform 12-16
 program, free form data base 12-40
 program, FREEWAY 7-52
 program from COMAL, run a BASIC 8-75
 program, fun'print 8-36
 program (game), dodge'em 4-38
 program (game), dog'chases'cat 5-32
 program (game), pitfall'harry 5-44
 program (game), spritecollision 5-31
 program, GENERATE'NEWERRS 6-43
 program, graphics example 10-47
 program, graphing 7-48
 program, GRAPHS2.L graphing 7-48
 program, GUTENBERG lettering 4-34
 program header convention 1-22,9-18
 program, ICONMAKER 9-27
 program, ILLUSION 8-10
 program, installment repayment 8-60
 program, inventory 5-47
 program, joy'cursor 7-77
 program, joystick drawing 1-18
 program, kelly's beach (game) 12-62
 program, KEYPAD64 6-16
 program, kilroy 10-55
 program, KOALA'DEMO 1-19
 program, KWI-KLOAD boot 7-25
 program, large letter 7-26
 program, least squares curve graphing 6-74
 program, LIBRARIAN 6-76
 program line, find last 7-74
 program line, spaces in 1-26
 program lines, deleting 11-73
 program lines, spaces in 6-63
 program, LINK font in running 10-31
 program, "linkage" 2-10
 program LIST to disk, indented 4-18,5-36,6-43,7-78
 program listing bug, BIGLETTER/DEMO 2-21
 program listing, COMAL 0.14 mixed case 5-22
 program listing, DIRECT'CON 9-14
 program listing, kelly's beach 12-68
 program, loading fonts from a running 7-57
 program, loan payments 12-19
 program, LST.GRAPHs graphing 7-48
 program, machine language clock 5-26
 program, MAGIC graphics 6-7
 program, make'data 8-45
 program, make'data'stmts 7-60
 program, make'object'file 7-61
 program, menu window 11-18
 program, MICROSCRIBBLE 1-18
 program, missing letters game 8-69
 program, ml'procs 5-29
 program, ml'setup 5-26,5-27
 program, ml'string/demo 4-42
 program, modem 2-34
 program, mortgage repayment 8-60
 program, music'all/demo 4-40
 program, music'compiler 8-30
 program name convention 1-22
 program name table, displaying a 5-46
 program, nmi-alarm 5-38
 program, numeric keypad 6-16
 program, num-string/demo 4-49
 program output memory location 9-18
 PROG'RAM package maker tutorial 9-73
 PROG'RAM package maker 9-73
 program, picfinder 12-32
 program, pinwheel graphics 6-45
 program, pixel'dump 4-33
 program, polar graphs 5-50
 program, polar'roses graphics 6-41
 program, polygons 7-67
 program, prnt'lrg'chars 7-26
 program, PROG'RAM 9-2
 PROG'RAM program 9-2
 program protection, PROTECT64 6-38,7-3,7-74
 program protection 7-74
 program, PROTECTOR 4-17
 program, QLINK simulator 12-29
 program, RAM ERRORS 4-23
 program, ram'errors 4-24
 program, random forest 8-26
 program, RANDOM.PLOT ink blot 4-53
 program, read'directory 7-58
 program, read'sprite 5-26
 program, reverse'bitmap 5-27
 program, rule based 10-16
 program, save font in running 10-31
 program SAVE, function key 7-19
 program, save graphics screen 5-27
 program scratch protect 4-17
 program, scroll'down/demo 4-50
 program, SELECT INPUT in a running 9-33
 program, SEQ'PRINT 4-18
 program, shadow letters 6-34
 program, SHOW-STOPPER 5-31
 program, sideways print 12-10
 program, sign language 5-33
 program, sound'effects 12-61
 program, SPIROLATERAL graphics 4-35
 program, sprite digital clock 3-43
 program, sprite flipping 5-26
 program, sprite'master 8-46
 program, star 4-48,8-65
 program, symbolic differentiation 9-53

program, telephone number data base 10-45
 program, three dimensional molecule 6-32
 program to a package, converting a 9-73
 program, TURBO 64 boot 7-25
 program, turtle/demo 5-33
 program, TWO'DRIVE'COPIER 4-18
 program, unlistable 9-58
 program using relative files, mailing list 7-69
 program version number 11-55
 program, VT-52 terminal emulator 2-34
 program, WALKER 10-44
 program, WALL'CLOCK 4-29
 program, wandering 4-39
 program, WORD GAME 8-69
 programming, GOTO and structured 6-64,6-78
 PROGRAMMING IN COMAL booklet, HINTS FOR 5-8
 programming, spaces in COMAL 11-74
 PROGRAMMING WITH COMAL book review, STRUCTURED 2-23,7-42
 PROGRAMMING WITH COMAL Disk directory listing,
 STRUCTURED 2-19,5-60
 programs and articles, submitting 11-72
 programs, cartridge compatibility with other 6-38
 programs catalog, COMAL 5-11
 programs, ENTERing 1-3
 programs from being deleted, protecting 8-55
 programs, graphics screen-dump 6-44
 programs into COMAL 2.0, loading COMAL 0.14 6-4
 programs, list of 1063 COMAL 5-11
 programs, listing 5-9
 programs, menus in BBS 11-5
 programs on the disk drive, examining 7-59
 programs, Speedscript conversion 11-74
 programs to 2.0, converting 0.14 12-42
 PROLOG 10-10
 PROMAL benchmark 12-38
 PROMAL language review 5-37
 protect, program scratch 4-17
 PROTECT64 program protection 6-38,7-3,7-74
 protected INPUT 5-10,6-6,6-15
 protecting programs from being deleted 8-55
 protection, program 7-74
 protection, PROTECT64 program 6-38,7-3,7-74
 PROTECTOR program 4-17
 PROWRITER-8510 graphics screen-dump 4-32
 punctuation in COMAL 8-8
 purchases by schools 3-15
 put'char procedure bug 5-42
 PUT'CHAR procedure 2-31
 QLINK simulator program 12-29
 Quantum Link network 9-1
 Queens chess problem, Eight 5-11
 QUICK 0.14, COMAL 8-1
 QUICK CHIP for the COMAL 2.0 cartridge 8-1
 quick DATA reading in COMAL 2.0 7-67

QUICK fastloader for COMAL 0.14, COMAL 9-7
 quicksort 10-20
 quirks, COMAL 2.0 sprite 10-24
 quote mark, end 1-26
 quote mode, turn off 5-27
 quote mode 6-49
 RABBIT package 1541 drive speedup 12-5
 radical program, complex 7-68
 radio code trainer, HAM 9-48
 radio show, FOCUS ON COMMODORE 3-9
 RAM, batch files from 7-32
 RAM disk 11-63
 RAM ERRORS program 4-23
 RAM, fast error messages to 6-43
 RAM under I/O and character generator, accessing 3-43
 ram'errors program 4-24
 random file bug fix, SETRECORDDELAY 6-39
 random file bug 1-24,2-4,3-18,6-38,7-17,8-33
 random file, copy 6-37
 random file errors, trapping 6-39
 random file example 10-9
 random file size finder 10-42
 random files simulation routine, CREATE 3-27
 random forest program 8-26
 RANDOMIZE simulation routine 3-28
 RANDOM.PLOT ink blot program 4-53
 ratings, power supply 12-76
 read sprite in COMAL 0.14 5-26
 read'dir procedure 12-50
 read'directory program 7-58
 reader, improved fast directory 12-50
 reading in COMAL 2.0, quick DATA 7-67
 reading program, fast directory 7-58
 read'sprite program 5-26
 reboot routine, COMAL 11-24
 record errors, trapping relative 6-39
 recover a lost file 11-24
 recursion tutorial 2-14,3-15,8-41
 recursion versus reiteration 8-40
 recursion 10-12
 recursive, function keys not 7-77
 redefining function keys 7-21
 reduction repayment program, direct 8-60
 REFERENCE GUIDE, COMAL 6-68
 register, checkbook 12-31
 Regnecentralen COMAL 5-6
 reiteration, recursion versus 8-40
 relative file, copy 6-37
 relative files, mailing list program using 7-69
 relative record errors, trapping 6-39
 relocating CIE IEEE interface support code 3-34
 remaining memory, checking 11-38
 remote controlled C64 12-75
 repayment program, direct reduction 8-60

KEYWORDS AND PHRASES

repayment TO running

repayment program, installment 8-60
 repayment program, mortgage 8-60
 repeat, keyboard 10-29
 repeat'keys procedure 6-43
 request procedure, interrupt 8-62
 requirements, peripheral device power 12-76
 reserved names in COMAL 2.0 6-38
 restart interrupted INPUT 5-25
 RESTORE command tutorial 7-67
 RESTORE key disable 7-78,10-29
 RESTORE KEY enable 10-29
 RESTORE to label for COMAL 0.14 6-71
 restrictions on META package 10-65
 return, shifted 6-39
 REVEAL procedure 9-58,10-1,10-2
 reverse characters, PLOTTEXT for 3-17
 reverse field characters, PLOTTEXT 4-27
 reverse graphics screen 5-27
 reverse Polish notation 5-12
 reverse'bitmap program 5-27
 review, BEGINNING COMAL book 2-27,3-36,7-36
 review, CAPTAIN COMAL GETS ORGANIZED book 2-12,3-36,7-41
 review, CAPTAIN COMAL'S GRAPHICS PRIMER book 7-37
 review, CARTRIDGE GRAPHICS AND SOUND book 7-38
 review, CARTRIDGE TUTORIAL BINDER book 7-43
 review, COMAL 0.14 cartridge 4-16
 review, COMAL 2.0 PACKAGES book 6-40,7-35
 review, COMAL cartridge 4-9
 review, COMAL FROM A TO Z book 7-34
 review, COMAL HANDBOOK book 2-9,2-31,7-44
 review, COMAL LIBRARY OF FUNCTIONS AND PROCEDURES book 7-35
 review, COMAL STARTER KIT 6-44
 review, COMAL WORKBOOK book 7-34
 review, COMMODORE 64 GRAPHICS WITH COMAL book 7-39
 review, FOUNDATIONS IN COMPUTER STUDIES WITH COMAL book 2-7,3-41,7-40
 review, GRAPHIC PRIMER book 6-21
 review, PROMAL language 5-37
 review, STARTING WITH COMAL book 10-49,11-13
 review, STRUCTURED PROGRAMMING WITH COMAL book 2-23,7-42
 review, TODAY Disk #03 3-4
 right, COMAL 0.14 distribution 6-42
 ROADMAN game, ROD THE 9-58,10-2
 Roadman game solution, Rod the 12-75
 Robot, LEGO 8-1
 Rod the Roadman game solution 12-75
 ROD THE ROADMAN game 9-58,10-2
 ROM access from COMAL 2.0, character 6-37
 ROMMED package 10-65
 root mean square of an array 9-26
 rose curve 5-50
 rotation, font 10-30
 rotations, Euler angle 2-16
 round circles 12-79
 ROUND function 6-44
 rounding errors, correcting for 9-32
 routine : see also algorithm, emulation, function, procedure, program, simulation
 routine, CIRCLE simulation 3-24
 routine, COMAL reboot 11-24
 routine, CREATE random files simulation 3-27
 routine, CREATE simulation 3-24
 routine, CURCOL simulation 3-24,3-27
 routine, CURROW simulation 3-24,3-27
 routine, CURSOR simulation 3-24,3-27
 routine, GETBACKGROUND simulation 3-26
 routine, GETBORDER simulation 3-27
 routine, GETPEN simulation 3-25
 routine, GETPENCOLOR simulation 3-25
 routine, GETSPRITECOLOR simulation 3-25
 routine, GETTURTLESIZE simulation 3-25
 routine, GRAPHICSTATE simulation 3-26
 routine, HEADING simulation 3-24
 routine, HIDESCREEN 3-26
 routine, JOYSTICK 4-39
 routine, MOUNT simulation 3-28
 routine, PADDLE 4-39
 routine, PAGE simulation 3-27
 routine, PLOT'CHAR 3-17
 routine, POLYGON 3-26
 routine, RANDOMIZE simulation 3-28
 routine, SHOWSCREEN 3-26
 routine, SHOWSPRITE simulation 3-26
 routine, SPRITESTATE simulation 3-25
 routine, SPRITEXCOR simulation 3-25
 routine, SPRITEXSIZE simulation 3-25
 routine, SPRITEYCOR simulation 3-25
 routine, SPRITEYSIZE simulation 3-25
 routine, TIME simulation 3-27
 routine, TURTLESTATE simulation 3-25
 routine, VAL simulation 3-28
 routine, XCOR simulation 3-24
 routine, YCOR simulation 3-24
 routines as packages, machine language 10-62
 routines, BIGDUMP'NEC 5-64
 routines for COMAL 0.14, music 8-34
 routines for COMAL 0.14, sound 8-34
 routines, graphs.l 5-40
 routines, sound control 4-40
 RTC MULTI-LINK networking cartridge 3-29
 rule based program 10-16
 run a BASIC program from COMAL 8-75
 RUN DEMO Disk directory listing, AUTO 5-62
 run for COMAL 0.14, auto 6-54
 running program, changing a function in a 10-64
 running program, LINK font in 10-31
 running program, loading fonts from a 7-57

running program, save font in 10-31
running program, SELECT INPUT in a 9-33
running SEQ type data files 5-9
run-time compiler 11-77
RX80 screen-dump package, Epson 10-72
safe cartridge installation 7-74
safe memory in COMAL 0.14 2-33,4-18
SAMPLER disk bug 4-55
SAMPLER disk, COMAL 3-13
SAMPLER DISK directory listing 5-62
save font in running program 10-31
SAVE, function key program 7-19
save graphics in COMAL 0.14 6-66
save graphics screen program 5-27
save graphics screen to disk 3-38
SAVE graphics screens 6-75
"SAVE IT" key 11-55
save memory to disk 3-37
SAVE'GRAPHICS'SCREEN procedure 3-38
SAVESCREEN for COMAL 0.14 6-66
savescreen program bug 5-37
saveshape procedure, sprite 8-21
saving function key definitions 9-33
scaling, graphics screen 12-79
schedule program, depreciation 8-52
schematic, COMAL 2.0 cartridge 12-0
schematic for black COMAL 2.0 cartridge 12-81
school, COMAL in 1-3,2-24,9-4,9-8,12-49
SCHOOL COMAL PACKAGE offer 9-9
school price list, COMAL 9-9
schools, purchases by 3-15
SCIENCE disk, MATH AND 9-2
scratch protect, program 4-17
screen : see also bitmap, drawing, graphics, picture,
pixel
screen, C128 80 column 11-26
screen colors, changing 10-52
screen colors, modifying default 10-29
screen, COMAL 2.0 split 6-9
screen compactor, graphics 10-68
screen compression, graphics 10-69
screen, control P print text 5-28,7-57
screen editing, full 1-26
screen from disk, load graphics 3-39
screen, INPUT from graphics 2-12
screen memory location, graphics 2-33,4-41
screen memory location, text 2-33
screen, POKE character to 2-31
screen program, save graphics 5-27
screen, reverse graphics 5-27
screen scaling, graphics 12-79
screen, scroll down text 4-50
screen, scrolling the text 8-59
screen, sequential file to 8-43

screen, show 40 sprites on 12-65
screen sprites, text 11-38
screen state, determining 3-26
screen to disk, save graphics 3-38
screen to string, graphics 10-56
SCREEN'CHAR procedure 2-31
screen-dump, 1520 plotter graphics 5-51
screen-dump, Commodore printer graphics 4-30
screen-dump, double-size graphics 4-32
screen-dump, Epson MX-80 graphics 3-40
screen-dump explained, graphics 4-30
screen-dump for Gemini-10X, graphics 7-66,9-67
screen-dump, Gemini-10 graphics 4-33
screen-dump, Gemini-10x "color" 9-67
screen-dump, graphics 6-7
screen-dump in COMAL 2.0, Gemini graphics 6-37
screen-dump in COMAL, graphics 3-31
screen-dump, multicolor graphics 6-41,11-56
screen-dump, NEC-8023 graphics 4-32
screen-dump, Okidata-92 graphics 5-18,11-56,12-20
screen-dump package, Epson RX80 10-72
screen-dump package, Epson 10-66
screen-dump package, Gemini-10x 10-72
screen-dump package, Okidata-93a 10-72
screen-dump programs, graphics 6-44
screen-dump, PROWRITER-8510 graphics 4-32
screen-dump, text 4-33
screen-dump, VIEWPORT command and 6-27
screen-dumps available, graphics 4-47
screen'prompt editing procedure 7-70
screens and COMAL, 80 column 11-75
screens, SAVE graphics 6-75
scroll down text screen 4-50
scroll'down procedure 8-59
scroll'down/demo program 4-50
scrolling editor, smooth 12-3
scrolling text bug 9-63
scrolling the text screen 8-59
secondary address, accessing printer 6-49
secondary address, printer 1-24
SELECT and printer control codes 2-28
SELECT command tutorial 5-36
SELECT command 6-11
SELECT "DS:" bug 1-24
SELECT INPUT in a running program 9-33
SELECT "LP:" and CAT bug 1-25
SELECT "LP:" for any device 3-35
selection sorting 10-18
sell COMAL, license to 1-23
sending escape codes to printer 6-49
SEQ type data files, running 5-9
SEQ'PRINT program 4-18
SEQ'TO'SPEED bug 9-46
seq'to'speed instructions 11-74

KEYWORDS AND PHRASES
sequential TO SLIDE

sequential file converter, Speedscript to 8-56
sequential file to screen 8-43
Serenade, Sid 6-68
SERIAL command 5-35
SERIES explained, CAPTAIN COMAL 1-26
series, Taylor 2-16
series, USER GROUP disk 6-42
set, 19 disk 6-44
set, 80 column character 7-54
set theory, algebraic 10-17
SETGRAPHIC command 1-13,10-50,10-52
SETGRAPHIC, NEW interferes with 6-42
SETHEADING 10-51
SETMSG command 2-30
SETMSG state detection 10-29
SETPAGE command tutorial 6-62
SETRECORDDELAY command 6-5,6-39
SETRECORDDELAY random file bug fix 6-39
SETSCORE bug, COMAL-80 Tutorial Binder 11-8
SETTEXT 10-52
seventeen languages, benchmarks for 12-37
shades table, colors and gray 2-13
shadow letters program 6-34
shape file, DATA statements from sprite 8-45
shape files, sprite 8-21
shapes, LINKing sprite 5-5
shifted letter in disk ID 4-55
shifted return 6-39
shifted space 6-39
shirt, COMAL 3-3
Shop graphics editor, Print 9-27
Shop Icon Editor, Print 10-1
shortcut, substring 11-24
shortcuts, COMAL 2-23
SHOW #01 Disk directory listing, SLIDE 5-62
SHOW #02 Disk directory listing, SLIDE 5-62
show 40 sprites on screen 12-65
SHOW disks, SLIDE 9-38
show, FOCUS ON COMMODORE radio 3-9
Show (humor), West Coast Commodore 6-18
Show, MARCA Computer 8-1
showing the COMAL 2.0 name table 9-68
SHOWSCREEN routine 3-26
SHOWSPRITE command 6-8
SHOWSPRITE simulation routine 3-26
SHOW-STOPPER program 5-31
shuffle sorting 10-18
SID : see also music, sound
Sid Serenade 6-68
SID, simulated signal from 5-42
sided disks, two 9-28
sideways print program 12-10
sieve of Eratosthenes benchmark 5-1,12-38
SIG (Special Interest Group) 10-48

sigma function 9-26
sign language program 5-33
signal from SID, simulated 5-42
signal processing, aliasing in 5-42
simple benchmark, Ahl's 12-38
simulated signal from SID 5-42
simulation : see also algorithm, emulation, function,
 procedure, program, routine
simulation procedure, STR\$ 2-6,2-7,3-28,4-49,5-43
simulation procedure, VAL 2-6
simulation routine, CIRCLE 3-24
simulation routine, CREATE random files 3-27
simulation routine, CREATE 3-24
simulation routine, CURCOL 3-24,3-27
simulation routine, CURROW 3-24,3-27
simulation routine, CURSOR 3-24,3-27
simulation routine, GETBACKGROUND 3-26
simulation routine, GETBORDER 3-27
simulation routine, GETPEN 3-25
simulation routine, GETPENCOLOR 3-25
simulation routine, GETSPRITECOLOR 3-25
simulation routine, GETTURTLESIZE 3-25
simulation routine, GRAPHICSTATE 3-26
simulation routine, HEADING 3-24
simulation routine, MOUNT 3-28
simulation routine, PAGE 3-27
simulation routine, RANDOMIZE 3-28
simulation routine, SHOWSPRITE 3-26
simulation routine, SPRITESTATE 3-25
simulation routine, SPRITEXCOR 3-25
simulation routine, SPRITEXSIZE 3-25
simulation routine, SPRITEYCOR 3-25
simulation routine, SPRITEYSIZE 3-25
simulation routine, TIME 3-27
simulation routine, TURTLESTATE 3-25
simulation routine, VAL 3-28
simulation routine, XCOR 3-24
simulation routine, YCOR 3-24
simulation using disk buffer, STR\$ 12-25
simulation using disk buffer, VAL 12-25
simulator program, QLINK 12-29
siren sound procedure 8-35
SIZE command 11-38
size, determining sprite 3-25
size, determining turtle 3-25
size finder, random file 10-42
size graphics dump for NEC printer, double 5-64
Sizzle fastload for COMAL 0.14 9-43
Sketch light pen, Tech 7-78
Skyles 1541 FLASH 6-43
sleeves, disk directories for disk 11-40
SLIDE SHOW #01 Disk directory listing 5-62
SLIDE SHOW #02 Disk directory listing 5-62
SLIDE SHOW disks 9-38

SMALL COMPUTERS book, ARTIFICIAL INTELLIGENCE FOR 7-56
smooth scrolling editor 12-3
Society of Ireland, Computer Education 2-17
socket, cartridge empty 5-3,12-74
SOFTWARE book, THE BEST VIC/COMMODORE 2-5
Software SPRITE MASTER, Access 8-46
solution, Rod the Roadman game 12-75
solver, differential equation 7-73
SONG EDITOR program for COMAL 2.0 6-68
SONG (humour), COMAL 7-52
sort, bubble 10-20
sorting by sound 8-22
sorting disk directories 8-55
sorting, exchange 10-19
sorting, external 10-21
sorting, internal 10-18
sorting, selection 10-18
sorting, shuffle 10-18
sound : see also music, SID
SOUND book review, CARTRIDGE GRAPHICS AND 7-38
sound control routines 4-40
sound effects, sprites with 9-64
sound procedure, alarm 8-35
sound procedure, siren 8-35
sound routines for COMAL 0.14 8-34
sound, sorting by 8-22
sound'effects program 12-61
soundex approximate string matching algorithm 8-22
Soundex bug 11-8
space (graphic), COMAL-80 address 5-5
space, shifted 6-39
spaces in COMAL programming 11-74
spaces in program line 1-26
spaces in program lines 6-63
spaces in string, pad 5-23
Spanish COMAL 5-3
special effects, text 6-34
(Special Interest Group), SIG 10-48
specifying drive number 12-46
spectrum, power 11-67
speech synthesizer, Microvox 4-47
speed, changing C128 clock 10-29
speed, COMAL execution 6-17
speed up cartridge, 1541 Express drive 4-17
Speedscript conversion programs 11-74
Speedscript convertor bug 9-46
Speedscript to sequential file converter 8-56
SPEED'TO'SEQ bug 9-46
speedup, RABBIT package 1541 drive 12-5
spice up printed messages 8-36
SPIROLATERAL graphics program 4-35
splat files 11-25
split screen, COMAL 2.0 6-9
sprite alphabet images 4-47
sprite animation example 10-44
sprite animation tutorial 9-64
sprite bug 10-25
sprite collision detection 10-24
sprite collision flags, clear 2-30
sprite color, determining 3-25
sprite coordinates, determining 3-25
sprite data file, DATA statements from 12-65
sprite digital clock program 3-43
sprite flipping program 5-26
sprite images, changing 9-30
sprite images 1-16
sprite in COMAL 0.14, read 5-26
sprite loadshape procedure 8-14
sprite maker program, font 8-44
SPRITE MASTER, Access Software 8-46
sprite memory in COMAL 2.0, accessing 6-41
sprite memory locations in COMAL 2.0 6-41
sprite memory locations 2-17
sprite procedure, METAMORPHOSE 9-30
sprite quirks, COMAL 2.0 10-24
sprite saveshape procedure 8-21
sprite shape file, DATA statements from 8-45
sprite shape files 8-21
sprite shapes, LINKing 5-5
sprite size, determining 3-25
sprite state, determining 3-25
sprite tutorial (game) 5-31
sprite tutorial 1-15,8-12
spritecollision program (game) 5-31
SPRITE'DESIGNER program bug 2-21
SPRITEINQ bug 10-25
SPRITEINQ command 10-24
SPRITE-MASTER image file converter 8-46
sprite'master program 8-46
SPRITEPOS 10-44
sprites, and fonts bug, LINKing packages, 7-50
sprites on screen, show 40 12-65
SPRITES program bug, EASY 9-4
sprites, text screen 11-38
sprites with sound effects 9-64
SPRITESTATE simulation routine 3-25
SPRITEXCOR simulation routine 3-25
SPRITEXSIZE simulation routine 3-25
SPRITEYCOR simulation routine 3-25
SPRITEYSIZE simulation routine 3-25
square of an array, root mean 9-26
squares curve graphing program, least 6-74
squares fit, nonlinear least 2-16
STACK OVERFLOW explained 2-15
STACK OVERFLOW from endless loop 6-66
standard, COMAL 1-26,6-53
standard deviation of an array 9-26
standard, GRAPHICS KERNAL 7-8

KEYWORDS AND PHRASES
standardization TO Tech

standardization meeting, COMAL-80 2-17
standardization meeting of April 1984, COMAL 3-3
star program 4-48,8-65
STARTER KIT review, COMAL 6-44
starting a COMAL Club 2-22,10-48
starting address of a string, finding the 4-43
STARTING WITH COMAL book review 10-49,11-13
STARTING WITH COMAL book 7-11
startup disk 10-41
state detection, SETMSG 10-29
state, determining pen 3-25
state, determining screen 3-26
state, determining sprite 3-25
state, determining turtle 3-25
statement, comma in print 5-12
statement, suppress line feed in PRINT 5-12
statements, convert machine code to DATA 7-60
statements from machine language, DATA 6-36
statements from sprite data file, DATA 12-65
statements from sprite shape file, DATA 8-45
statements, indented 1-25
statements, modifying data 10-17
statements, nested IF 10-59
States Commodore Users Group, United 3-20
statistics demo 11-37
STATUS command 10-26
STOP key tutorial 3-7
STOPSPRITE command 10-24
storage in WRITE files, integer 7-51
storing machine language in a string variable 4-42
STR\$ simulation procedure 2-6,2-7,3-28,4-49,5-43
STR\$ simulation using disk buffer 12-25
string, altering a 12-74
string, finding the starting address of a 4-43
STRING from number procedure 2-7
string, graphics screen to 10-56
string matching algorithm, soundex approximate 8-22
string, pad spaces in 5-23
string tutorial 6-73,7-47,9-70,11-24
string variable, finding the location of a 4-42
string variable, storing machine language in a 4-42
strings tutorial, COMAL 5-23
strings with &, combine 5-16
structure bibliography, COMAL 11-77
structure of COMAL, internal 4-42,5-12,5-54,8-28,9-50
structured programming, GOTO and 6-64,6-78
STRUCTURED PROGRAMMING WITH COMAL book review 2-23,7-42
STRUCTURED PROGRAMMING WITH COMAL Disk directory listing
2-19,5-60
Student Tutorial Learning Environment, Computer Assisted
2-24
STUDIES WITH COMAL book review, FOUNDATIONS IN COMPUTER
2-7,3-41,7-40
STUDIES WITH COMAL Disk directory listing, FOUNDATIONS
IN COMPUTER 2-20,5-60
submitting programs and articles 11-72
substitute, COMAL 2.0 dynamic keyboard 10-31
substitutions, keyword 2-23
substring shortcut 11-24
substring tutorial 6-73,7-47
suffix, .crg 10-68,11-61
suffix, .hrg 10-69
suggestions, color combination 1-9,2-13
sum of an array 9-26
supply problems, power 6-35
supply ratings, power 12-76
support code, relocating CIE IEEE interface 3-34
suppress line feed in PRINT statement 5-12
switch 1571 to 1541 drive mode 12-77
switching, bank 5-36
switching case mode 7-78
SX-64 and COMAL cartridge 6-36
symbolic differentiation program 9-53
symbolic differentiation 11-66
syntax differences between COMAL 0.14 and 2.0 6-5
SYNTAX ERROR explained 3-17
synthesizer, Microvox speech 4-47
sys command, BASIC to COMAL 10-29
system bug, graphics 1-23
system, CASTLE education 2-24
system, compacted picture 11-61
SYSTEM DISK bug, COMAL 4-55
system, DISK DATA BASE 6-50
SYSTEM Disk directory listing, COMAL 0.14 2-18
system, graphics editor 11-1,11-57
system, picture compression 10-61
system, POPOVER menu 11-1,11-18
systems, expert 10-10,10-16
table, color combination 2-13
table, colors and gray shades 2-13
table, COMAL 0.14 name 4-42
table, COMAL 2.0 token 9-54
table, COMAL name 5-14
table, Commodore ASCII code 9-20
table, displaying a program name 5-46
table limits, name 1-21
table memory location, COMAL keyword 5-16
table of contents, BEGINNING COMAL book 4-44
table, showing the COMAL 2.0 name 9-68
tables, COMAL internal 5-13
tape cassette and COMAL 1-19,1-25
tape, lessons on video 12-24
Taylor series 2-16
TCD COMAL 5-6
teachers list, COMAL 9-4
teaching COMAL 2-25,2-27,12-18
teaching with a VCR 12-24
Tech Sketch light pen 7-78

TED computer 1-2
 telephone number data base program 10-45
 Teli Datorer COMAL 5-6
 tempo function 4-41
 terminal emulator program, VT-52 2-34
 testing for available drive units 10-73
 TEST'SIGNAL procedure 5-42
 text : see also alphabet, character, font, letter
 text buffer 11-63
 text bug, scrolling 9-63
 text package 11-63
 text screen, control P print 5-28,7-57
 text screen memory location 2-33
 text screen, scroll down 4-50
 text screen, scrolling the 8-59
 text screen sprites 11-38
 text screen-dump 4-33
 text special effects 6-34
 TEXTCOLOR command 6-9
 THE BEST VIC/COMMODORE SOFTWARE book 2-5
 THE GRAPHICS TOOLBOX disk 9-2
 theory, algebraic set 10-17
 three dimensional fractals on 1520 plotter 12-26
 three dimensional molecule program 6-32
 three-pass interpreter 11-77
 TIME command 11-38
 TIME simulation routine 3-27
 time units, lightpen DELAY 6-38
 time units, lightpen TIMEON 6-38
 time-of-day clock 5-38
 TIMEON time units, lightpen 6-38
 timings, IBM PC benchmark 12-39
 tips, file handling 11-25
 TOD clock 5-38
 TODAY #01 Disk directory listing 2-18
 TODAY #01 Disk directory listing 5-57
 TODAY #02 Disk directory listing 5-57
 TODAY #02 page-32 bug, COMAL 4-39
 TODAY #03 Disk directory listing 4-54
 TODAY #03 Disk directory listing 5-57
 TODAY #04 Disk directory listing 5-57
 TODAY #05 Disk directory listing 5-58
 TODAY #06 Disk directory listing 6-81
 TODAY #07 Disk directory listing 7-79
 TODAY #08 Disk directory listing 8-77
 TODAY #09 Disk directory listing 9-77
 TODAY #11 Disk directory listing 12-78
 TODAY Disk #03 review 3-4
 TODAY European distributor, COMAL 6-46
 TODAY, user groups and COMAL 8-64
 toggle'graph'keys procedure 8-33
 TOGGLE'KEYS bug 9-7
 toggling function keys in COMAL 2.0 8-33
 token list, COMAL 5-15
 token list for COMAL 0.14 6-76
 token table, COMAL 2.0 9-54
 tokenization in COMAL 2.0 9-50
 tokenization in COMAL 5-12
 tokens : see also internal structure, memory map, name table
 TOOLBOX disk, THE GRAPHICS 9-2
 TRACE command 6-6,6-15
 TRACE list to file 6-39
 TRACE list to printer 6-39
 TRACE tutorial 9-26
 TRACKBALL, WICO 2-33
 trainer, HAM radio code 9-48
 transfer between C64 and IBM PC, file 9-12
 Transform bug, Fast Fourier 11-68
 Transform, Fast Fourier 11-67
 transform program, Fourier 12-16
 Transformer, Amiga with 11-10
 translator explained, COMAL 5-12
 TRAP tutorial 9-24
 trapezoid integration 12-16
 trapping, error 8-48
 trapping random file errors 6-39
 trapping relative record errors 6-39
 trapping tutorial, error 6-14
 tree, decision 10-16
 trunc function 9-32
 TURBO 64 and COMAL 0.14 6-43
 TURBO 64 boot program 7-25
 Turbodisk and COMAL 8-4
 TURBODISK, loading COMAL 0.14 with 9-7
 turn off error messages 2-30
 turn off insert mode 5-27
 turn off quote mode 5-27
 turtle coordinates, changing 3-24
 turtle coordinates, determining 3-24
 turtle graphics chart 1-13
 turtle heading, determining 3-24
 turtle image, changing graphics 5-33
 turtle image 1-26
 turtle size, determining 3-25
 turtle state, determining 3-25
 turtle 3-24
 turtle/demo program 5-33
 TURTLESTATE simulation routine 3-25
 TUTOR disk, TYPING 9-2
 Tutor, Typing 10-1
 TUTOR 10-16
 tutorial, ANIMATE 9-64
 tutorial, array as parameter 4-48
 tutorial, batch file 6-52,7-30,8-50
 tutorial, beginners 4-25,4-27,5-8
 Tutorial Binder book, Cartridge 10-67
 TUTORIAL BINDER book review, CARTRIDGE 7-43

KEYWORDS AND PHRASES

Tutorial TO using

Tutorial Binder SETSCORE bug, COMAL-80 11-8
tutorial, CASE 11-4
tutorial, CAT command 11-22
tutorial, COMAL 0.14 graphics 6-55,6-56
tutorial, COMAL cartridge 6-3,6-6,6-8
tutorial, COMAL strings 5-23
tutorial, COMAL 7-22
tutorial, DEFKEY 7-21
tutorial, DIR command 11-22
TUTORIAL DISK comment 5-49
TUTORIAL Disk directory listing, BRICKS 6-81
TUTORIAL Disk directory listing 4-54,5-62
tutorial, ERROR HANDLER in COMAL 2.0 8-48
tutorial, error trapping 6-14
tutorial, external procedures 7-27
tutorial, file use 12-30
tutorial for COMAL 2.0, light pen 5-55
tutorial (game), sprite 5-31
tutorial, graphics 1-11
tutorial, graphing 5-40
tutorial, IF-THEN-ELSE 10-58
tutorial, INPUT command 3-7,7-49,7-77
Tutorial Learning Environment, Computer Assisted Student
2-24
tutorial, LINKSHAPE command 5-5
tutorial, LOADSHAPE command 5-5
tutorial, OPEN command 4-51
tutorial, PACKAGE 6-69
tutorial, parameter 2-32
tutorial, PASS command 5-8,10-26
tutorial, PRINT command 4-50
tutorial, PRINT FILE 2-8
tutorial, PRINT USING 2-28
tutorial, PROCEDURE 7-16
tutorial, PROGRAM package maker 9-73
tutorial, recursion 2-14,3-15,8-41
tutorial, RESTORE command 7-67
tutorial, SELECT command 5-36
tutorial, SETPAGE command 6-62
tutorial, sprite animation 9-64
tutorial, sprite 1-15,8-12
tutorial, STOP key 3-7
tutorial, string 6-73,7-47,9-70,11-24
tutorial, substring 6-73,7-47
tutorial, TRACE 9-26
tutorial, TRAP 9-24
tutorial, WRITE FILE 2-8
two 1541 drives, copy files with 10-71
two 1541 drives, copy with 4-18
two color INPUT 12-75
two column directory list 6-43
two column file printer 12-12
two sided disks 9-28
TWO'DRIVE'COPIER program 4-18
type data files, running SEQ 5-9
type, detecting drive 9-36
type file, PRG 1-25
type procedure 8-43
TYPING Disk 10-1
TYPING TUTOR disk 9-2
Typing Tutor 10-1
U key in COMAL 2.0, control 8-33
under I/O and character generator, accessing RAM 3-43
undocumented opcodes 12-49
Unicomal 5-6
unit 9, PASS to disk drive 6-11,6-37
United States Commodore Users Group 3-20
units, lightpen DELAY time 6-38
units, lightpen TIMEON time 6-38
units, testing for available drive 10-73
unlistable program 9-58
unlock, case mode 6-41
up cartridge, 1541 Express drive speed 4-17
up printed messages, spice 8-36
upper and lower case, LIST in 3-35,9-6,10-6
usage, COMAL 0.14 memory 2-34
usage discussion, EOF 4-51
USE command 10-11
use of memory, efficient 1-5
use tutorial, file 12-30
used by COMAL, file numbers 7-17
user errors, accessing 3-7
USER GROUP #01 Disk directory listing 4-14
USER GROUP #01 Disk directory listing 5-58
USER GROUP #02 Disk directory listing 4-54
USER GROUP #02 Disk directory listing 5-58
USER GROUP #03 Disk directory listing 5-58
USER GROUP #04 Disk directory listing 5-59
USER GROUP #05 Disk directory listing 5-59
USER GROUP #06 Disk directory listing 5-59
USER GROUP #07 Disk directory listing 6-81
USER GROUP #08 Disk directory listing 7-79
USER GROUP #09 Disk directory listing 6-81
USER GROUP #10 Disk directory listing 9-77
USER GROUP #11 Disk directory listing 10-77
USER GROUP disk series 6-42
USER GROUP disks explained 4-12
user group information, COMAL 5-64
user groups and COMAL TODAY 8-64
user groups, list of COMAL 4-15
Users Group, German COMAL 7-72
Users Group, Holland COMAL 12-3
Users Group, United States Commodore 3-20
USING command, PRINT 1-24
using disk buffer, STR\$ simulation 12-25
using disk buffer, VAL simulation 12-25
Using Educators list, COMAL 7-4
using relative files, mailing list program 7-69

USING tutorial, PRINT 2-28
UTILITY Disk #02 directory listing 9-77
VAL emulator, floating point 1-20
VAL simulation procedure 2-6
VAL simulation routine 3-28
VAL simulation using disk buffer 12-25
valgol language (humour) 10-76
value, character PEEK 2-31
values, cartridge control key 6-7,6-34,11-14
values, LIGHTPEN default OFFSET 6-38
variable, finding the location of a string 4-42
variable name, apostrophe in 2-12
variable names, characters permitted in 2-12
variable, storing machine language in a string 4-42
variables, integer 1-22
vcr lessons 11-76
VCR, teaching with a 12-24
VERIFY command 12-79
version 1.02, COMAL 2-30
version number, program 11-55
versions clarified, COMAL 1-1
versus COMAL benchmarks, BASIC 2-35
versus GOSUB, PROC 11-73
versus Pascal, COMAL 3-20
versus PET memory locations, C64 1-2
versus reiteration, recursion 8-40
VIC/COMMODORE SOFTWARE book, THE BEST 2-5
video chip, C128 80 column 12-3
video detector (hardware), building a 7-55
video tape, lessons on 12-24
videocassette lessons 11-76
VIEWPORT command and screen-dump 6-27
virtual memory 5-36
volume procedure 4-41
VT-52 terminal emulator program 2-34
WALKER program 10-44
wall, drawing a brick 10-54
WALL'CLOCK program 4-29
wandering program 4-39
water pressure drop in pipes, calculating 7-71
waveform procedure 4-41
West Coast Commodore Show (humor) 6-18
where to get COMAL 11-75
WICO TRACKBALL 2-33
WINDOW command 11-75,12-79
WINDOW command 12-79
window program, menu 11-18
window'down bug 9-63
window'down procedure 8-59
window'up bug 9-63
window'up procedure 8-59
word game bug 11-8
WORD GAME program 8-69
word processor, fonts and Paperclip 12-75

words, converting numbers to 10-12
WORKBOOK book review, COMAL 7-34
WRITE file incompatibility, COMAL 0.14/2.0 7-51
WRITE FILE tutorial 2-8
WRITE files, integer storage in 7-51
XCOR simulation routine 3-24
YCOR simulation routine 3-24
YESTERDAY book, COMAL 10-8

Authors

- Abissi, Christopher J. 2-6
 Abissi, Christopher J. 11-5
 ApS, UniComal 6-22
 ApS, Unicomal 8-28
 Bacon, Phillip 9-43
 Bacon, Phillip 9-46
 Bacon, Phyrne 5-8
 Bacon, Phyrne 6-43
 Bacon, Phyrne 6-75
 Bacon, Phyrne 6-82
 Bacon, Phyrne 8-56
 Bacon, Phyrne 9-43
 Bacon, Phyrne 9-46
 Bacon, Phyrne 10-30
 Bacon, Phyrne 10-32
 Bacon, Phyrne 11-5
 Bacon, Phyrne 12-7
 Beaumont, Greg 1-17
 Bendoritis, Bill 2-10
 Bittinger, Doug 9-22
 Bokhorst, Marcel 12-4
 Bokhorst, Marcel 12-5
 Bolton, Ed 12-62
 Bolton, Ed 12-68
 Borden, Jim 6-16
 Bow, Will 6-50
 Brickley, Perry 2-5
 Bridgham, Malcom 7-26
 Bruhn, Steve 7-57
 Carter, Ray 3-18
 Carter, Ray 4-42
 Carter, Ray 5-31
 Carter, Ray 5-38
 Carter, Ray 6-7
 Carter, Ray 6-43
 Carter, Ray 9-67
 Carter, Ray 12-50
 Cartwright, Stephen Anson 1-1
 Christensen, Borge 1-8
 Christensen, Borge 2-25
 Christensen, Borge 9-58
 Claessen, Jerry 5-38
 Claessen, Jerry 6-38
 Clifford, Marc J. 4-49
 Clifford, Marc J. 6-68
 Clifford, Marc J. 6-68
 Clifford, Mark: see Clifford Marc J.
 Colbert, Glen E. 3-7
 Colbert, Glen 4-17
 Colbert, Glen 4-23
 Colbert, Glen 4-51
 Colbert, Glen 9-73
 Colbert, Glen 10-74
 COMAL, Captain 4-25
 COMAL, Captain 4-45
 COMAL, Captain 4-48
 COMAL, Captain 4-51
 COMAL, Captain 5-2
 COMAL, Captain 5-8
 COMAL, Captain 5-20
 COMAL, Captain 6-46
 COMAL, Captain 6-52
 COMAL, Captain 7-27
 COMAL, Captain 8-46
 COMAL, Captain 10-8
 COMAL, Captain 10-9
 COMAL, Captain 10-25
 COMAL, Captain 10-43
 COMAL, Captain 10-44
 COMAL, Captain 10-45
 COMAL, Captain 10-46
 COMAL, Captain 10-47
 COMAL, Captain 10-60
 COMAL, Captain 12-29
 COMAL, Captain 12-42
 COMAL, Captain 12-64
 Cook, Marvin 11-55
 Creasey, T. S. 3-10
 Creasey, T. S. 4-17
 Creasey, T. S. 4-17
 Creasey, T. S. 7-60
 Creasy, T. S.: see Creasey, T. S.
 Degrift, Craig Van 5-18
 Degrift, Craig Van 7-55
 Degrift, Craig Van 9-34
 Degrift, Craig Van 10-24
 Degrift, Craig Van 12-39
 Denaci, Bert 5-32
 Denaci, Bert 12-38
 Dipp, Tom 10-48
 Drake, Doug 2-7
 Drake, Doug 7-69
 Eddy, G. Raymond 12-25
 Eldredge, John 6-71
 Eldredge, John 8-52
 Erskine, Michael J. 7-77
 Erskine, Michael J. 8-24
 Erskine, Michael J. 8-33
 Erskine, Michael J. 10-16
 Finch, Randy 6-74
 Finch, Randy 7-25
 Finch, Randy 10-72
 Finley, Mark 6-65
 Foiles, Peter 4-32
 Foiles, Peter 4-47
 Foiles, Peter 4-47
 Foiles, Peter 5-64
 France, Ron 5-50

Frazee, Jerry D. 2-11
 French, Kendall 8-56
 Frerichs, Carl 5-33
 Frerichs, Carl 5-52
 Garraway, R. W. T. 2-24
 Graham, Rod 4-35
 Grainger, Brian 2-30
 Grainger, Brian 11-13
 Haas, Eric Edward 5-20
 Hoerter, Bob 6-34
 Hoerter, Bob 7-67
 Hoerter, Bob 9-45
 Hoerter, Bob 9-64
 Horowitz, Daniel 8-69
 Horowitz, Daniel 9-30
 Hughes, Garret A. 12-24
 Illman, R. W. 3-35
 Jones, George 6-34
 Jones, George 7-52
 Jones, George 7-58
 Junk, Debra Ruth 8-9
 Katz, Sol 11-4
 Klingens, Dick 7-50
 Klingens, Dick 8-41
 Klingens, Dick 10-18
 Klingens, Dick 11-63
 Klingens, Dick 11-65
 Klingens, Dick 12-4
 Klingens, Dick 12-25
 Knight, Jesse 1-20
 Knight, Jesse 1-22
 Knight, Jesse 3-43
 Knight, Jesse 4-32
 Knight, Jesse 4-43
 Knight, Jesse 4-53
 Knight, Jesse 5-26
 Knight, Jesse 7-32
 Knight, Jesse 7-50
 Knight, Jesse 7-57
 Knight, Jesse 8-62
 Kortendick, Steve 1-5
 Kortendick, Steve 4-36
 Kortendick, Steve 5-24
 Kramer, Valerie 5-28
 Kramer, Valerie 6-78
 Kramer, Valerie 10-50
 Kuiper, Tom 5-42
 Kuiper, Tom 5-43
 Kuiper, Tom 7-12
 Kuiper, Tom 7-48
 Kuiper, Tom 9-12
 Kuiper, Tom 9-14
 Kuiper, Tom 9-19
 Kuiper, Tom 9-20

Kuiper, Tom 9-53
 Kuiper, Tom 9-76
 Kuiper, Tom 3-11
 Kuiper, Tom 3-31
 Kuiper, Tom 4-33
 Kuiper, Tom 5-39
 Kuiper, Tom 5-40
 Kuiper, Tom 11-66
 Kuiper, Tom 11-67
 Kuiper, Tom 11-68
 Kurnot, Dennis 10-66
 Lawrence, Mike 9-33
 Lawrence, Mike 9-33
 Lawrence, Mike 9-68
 Lawrence, Mike 9-78
 Lawrence, Mike 10-11
 Lindsay, Len 1-1
 Lindsay, Len 1-1
 Lindsay, Len 1-3
 Lindsay, Len 1-10
 Lindsay, Len 1-15
 Lindsay, Len 2-2
 Lindsay, Len 2-7
 Lindsay, Len 3-3
 Lindsay, Len 3-7
 Lindsay, Len 4-4
 Lindsay, Len 4-9
 Lindsay, Len 4-38
 Lindsay, Len 5-23
 Lindsay, Len 5-31
 Lindsay, Len 5-35
 Lindsay, Len 5-36
 Lindsay, Len 5-47
 Lindsay, Len 6-6
 Lindsay, Len 6-42
 Lindsay, Len 6-53
 Lindsay, Len 8-12
 Lindsay, Len 8-44
 Lindsay, Len 8-45
 Lindsay, Len 9-8
 Lindsay, Len 10-40
 Lindsay, Len 10-70
 Lindsay, Len 11-18
 Lindsay, Rhianon 11-56
 Linn, Phred 8-26
 Long, Susan 7-67
 Louie, Wallace 3-10
 Louie, Wallace 3-37
 Louie, Wallace 3-38
 Louie, Wallace 3-39
 Louie, Wallace 3-40
 MacPhedran, Ian 5-45
 MacPhedran, Ian 6-75
 MacPhedran, Ian 6-76

AUTHORS

MacPhedran TO Stidolph

MacPhedran, Ian 7-56	Ricketts, Terry 12-81
MacPhedran, Ian 7-59	Ross, Robert 4-41
MacPhedran, Ian 7-61	Ross, Robert 8-55
MacPhedran, Ian 8-50	Ryan, Kevin 2-17
MacPhedran, Ian 9-54	Ryan, Kevin 5-6
MacPhedran, Ian 10-62	Ryan, Kevin 11-10
MacPhedron, Ian 9-50	Saller, Raymond E. 9-66
MacPhedron, Ian 10-49	Schiek, Jayne 4-44
Main, John 1-20	Schilling, John 7-54
Main, John 2-27	Schulz, Bob 5-55
Main, John 2-30	Schulz, Bob 7-55
Mathews, Ed 12-18	Seachord, Nicholas L. 9-32
Maven, David 2-29	Shellenberg, D. 12-10
McCarthy, Diarmuid 2-9	Shigley, Gordon 5-47
McCoy, John H. 2-34	Shigley, Gordon 8-60
McCoy, John H. 3-5	Shingledecker, Robert 6-47
McCoy, John H. 3-17	Shingledecker, Robert 8-25
McCoy, John H. 3-42	Skelton, Mindy 2-14
McCoy, John H. 3-43	Skelton, Mindy 3-15
McCoy, John H. 5-12	Skelton, Mindy 3-20
McCoy, John H. 5-19	Skelton, Mindy 6-55
McDonald, Ernie 7-16	Skelton, Mindy 6-56
McMullen, Ralph 12-30	Skelton, Mindy 6-59
McPhedron, Ian: see MacPhedron, Ian	Skinner, David 3-41
Mercurio, Michael 9-27	Skinner, David 5-21
Miller, W. P. 7-52	Skinner, David 9-10
Minge, Jennifer 6-44	Smullen, Steve 6-47
Nelson, Robert N. 6-72	Smullen, Steve 7-68
Parish, Daniel W. 11-30	Sommers, David G. 6-27
Parish, Daniel W. 12-54	Sommers, David 12-0
Pavase, Franco 9-34	Stidolph, David 6-13
Phillips, Larry 8-39	Stidolph, David 6-32
Phillips, Larry 10-10	Stidolph, David 6-54
Powell, David 11-37	Stidolph, David 6-62
Quiggle, Kevin 4-18	Stidolph, David 6-66
Quiggle, Kevin 4-29	Stidolph, David 6-69
Quiggle, Kevin 4-34	Stidolph, David 7-30
Quiggle, Kevin 4-53	Stidolph, David 7-57
Quiggle, Kevin 6-76	Stidolph, David 7-58
Quiggle, Kevin 7-56	Stidolph, David 8-30
Quiggle, Kevin 7-62	Stidolph, David 8-34
Quiggle, Kevin 8-22	Stidolph, David 9-27
Quiggle, Kevin 12-26	Stidolph, David 9-36
Quiggle, Kevin 12-37	Stidolph, David 9-70
Quiring, Raymond 6-64	Stidolph, David 2-5
Rasmussen, Bud 4-18	Stidolph, David 3-6
Ratcliff, Clay 3-41	Stidolph, David 4-30
Ratcliff, Clay 9-10	Stidolph, David 4-40
Rea, Joel Ellis 11-6	Stidolph, David 5-26
Rea, Joel Ellis 12-40	Stidolph, David 5-30
Rea, Joel Ellis 12-48	Stidolph, David 5-33
Renard, Jay 12-76	Stidolph, David 5-46
Ricketts, Terry 11-56	Stidolph, David 5-49
Ricketts, Terry 12-20	Stidolph, David 10-2

Stidolph, David 10-15
Stidolph, David 10-28
Stidolph, David 10-38
Stidolph, David 10-42
Stidolph, David 10-56
Stidolph, David 10-65
Stidolph, David 10-68
Stidolph, David 10-73
Stidolph, David 11-15
Stidolph, David 11-26
Stidolph, David 11-38
Stidolph, David 12-3
Stidolph, David 12-79
Strahl, Kenneth 6-41
Strahl, Kenneth 8-36
Strool, Scott 12-52
Tamkin, David 7-46
Tamkin, David 8-40
Thompson, Colin 3-13
Thompson, Colin 3-19
Thompson, Colin 3-30
Thompson, Colin 3-42
Thompson, Colin 4-12
Thompson, Colin 4-16
Thompson, Colin 4-27
Thompson, Colin 4-46
Thompson, Colin 5-17
Thompson, Colin 5-34
Thompson, Colin 6-3
Thompson, Colin 6-18
Thompson, Colin 7-22
Thompson, Colin 9-2
Thompson, Colin 9-32
Thompson, Colin 9-38
Thompson, Colin 9-69
Thompson, Colin 10-26
Thompson, Colin 10-31
Thompson, Colin 10-58
Thompson, Colin 10-69
Thompson, Colin 11-57
Thompson, Colin 12-32
Ventola, Jim 11-69
Ventola, Jim 12-12
Visser, Joe 12-21
Walsh, Birrell 9-24
Weick, Doug 6-61
Weiler, Peter 3-35
White, Jim 7-17
White, Jim 7-25
Winckles, Larry 11-14
Wood, Bill 7-49
Wright, Loren 4-33
Zabel, Lowell 7-71
Zabel, Lowell 7-73

Zabel, Lowell 12-16
Zamara, Chris 8-65

Titles

- 0.14 - The Enhancer 12-4
- 11,838 Bytes Free in COMAL 0.14 5-19
- 127 COMAL Colors 5-20
- 1520 Plotter 2.0 Graphics Dump 5-51
- 1520 Plotter Driver Procedures 7-62
- 1525 ML Screen Dump from COMAL 9-78
- 1541 Alignment 7-55
- 1541 Directory Editor 8-55
- 1541 Disk Alignment Update 9-34
- 1541 Express 4-17
- 1541 Flash and COMAL 6-43
- 1541 Flash Works With COMAL 2.0 5-39
- 170K Dynamic Keyboard 6-36
- 19 Different COMAL Disks Set 6-44
- 2.0 Auto Save 11-55
- 2.0 Cartridge - Grey 12-0
- 2.0 Data Base Manager 8-25
- 2.0 Disk Directory Tips 11-22
- 2.0 Find Last Program Line 7-74
- 2.0 Maximum Input Field Length 7-77
- 2.0 Modem Update 11-38
- 2.0 Packages Expand COMAL 6-69
- 2.0 Quick Trick For Data Reading 7-67
- 2.0 Scrolling Text 8-59
- 2.0 Scrolling Text 9-63
- 40 Column Combined Lines 1-24
- 5 Byte Integer - Not 2 7-51
- 80 Column Character Set 7-54
- A B C's are Now Sprites 4-47
- A Bug In COMAL 0.14 4-53
- A Bug Spotted 4-55
- A First Look At The 64K COMAL 2.0 Cartridge For Commodore 64 4-9
- A Missed IBM PC Sale 5-7
- A Notable Quote 4-55
- A Problem With Packages 7-50
- A Simple Exercise for Non-Gurus 7-22
- A Users Group Meeting 12-18
- A VT-52 Terminal Emulator Program 2-34
- Access RAM Beneath I/O & Char Gen 3-43
- Accessing User Errors 3-7
- Adjust Circle 12-79
- Ahoy! 12-72
- All COMAL Implementations Welcome 3-5
- Amazing Adventures of Captain COMAL 1-21
- Amazing Delete Key in COMAL 2.0 7-19
- Anatomy of a 2.0 Cartridge 6-27
- Another COMAL First - KOALA Control 1-19
- Another Fun Letter 6-17
- Another Look at COMAL 0.14 Tokens 6-76
- Any Device For Select "LP:" 3-35
- Approved and Endorsed 3-4
- ASCII Conversion in COMAL 2.0 9-19
- Attack of the Mutant COMALs 5-21
- Attention COMAL Authors 2-4
- Auto Run Your COMAL Program 6-54
- Autoexec 12-52
- Automated Proc & Func Librarian 6-76
- Automatic Listed File Printer 4-18
- Available Drives 10-73
- Ave Atque Vale 6-42
- Background On Random Files 3-18
- Bank Switching & Virtual Memory 5-36
- Batch File Use 7-30
- Batch Files From Memory 7-32
- Batch Files 6-36
- Behind The Scenes 12-64
- Benchmark: 1000 Primes 12-37
- Best Selling Books 11-12
- Best Selling COMAL Books 5-16
- Bestselling COMAL Books 10-25
- Big Letter 1-17
- Big Screen Dump 4-32
- Bit Map Printer 3-31
- Bitmap - A New Package 10-56
- Bitmap Compression - A New COMAL Package 10-68
- Bitmaps in COMAL 9-38
- Black 2.0 Cartridge Schematic 12-81
- Book Club Feature 4-24
- Book Review: Starting with COMAL 10-49
- Book Review STARTING WITH COMAL 11-13
- Book Reviews and Comparisons 6-44
- Books Included in Deluxe Cart Pak 6-37
- Bridge, Anyone? 9-45
- Bug Fixes 10-7
- Bug Fixes 11-8
- Bug Fixes 11-68
- Bug in COMAL TODAY #2 Page 29 5-23
- Bug in COMAL TODAY #2 Page 31 5-42
- Bug in COMAL TODAY #2 page 32 4-39
- Bus Expanders & COMAL Cartridge 6-35
- BUSCARD & COMAL 2.0 7-33
- BUSCARD COMAL Monitor 7-33
- C128 / 1571 Page 12-77
- C128 80 Column Screen 11-26
- C64 COMAL 0.14 Error Messages List 2-21
- C64 COMAL 0.14 Hi-res Graphics Dump 2-4
- C64 COMAL 0.14 Memory Map 4-19
- C64 COMAL 0.14 System Memory Map 3-42
- C64 COMAL 2.0 on Disk? No Way! 6-39
- C64 COMAL Gets Top Rating 2-5
- C64 COMAL Memory Map - A Beginning 2-5
- C64 COMAL Memory Map 6-28
- C64 COMAL-80 8-28
- C64 Graphics With COMAL Book 6-71
- C64 LINK With COMAL Update 2-6
- Call in Technical COMAL Questions 6-70
- Calling BASIC Programs 8-75

Captain COMAL Series 1-26	COMAL 2.0 Light Pen Use 5-55
Cartridge and IEEE Interfaces 5-35	COMAL 2.0 Modem Procs & Funcs 6-67
Cartridge Available Separately 6-38	COMAL 2.0 Modem Update 7-31
Cartridge Case - The Plastic Housing 6-35	COMAL 2.0 Modem Use 5-30
Cartridge Demo Disk Story 5-4	COMAL 2.0 Oki Data Graphics Dump 11-56
Cartridge Is Final 6-36	COMAL 2.0 Packages 6-40
Cartridge Label 6-35	COMAL 2.0 Pi and Trace 6-39
Cartridge Simultaneous Action 6-37	COMAL 2.0 Printscreen Notice 6-38
Case Lock & Unlock 6-41	COMAL 2.0 Sprite Quirks 10-24
CASTLE and Computer Assisted Instruction 2-24	COMAL 2.0 Token Table 9-54
CAT & DIR - The Same Thing in 2.0 6-39	COMAL 80 Standardization Meeting 2-17
Caught in a Loop - A Common Thing 6-66	COMAL and FORTRAN 4-52
Change 8 to 9 10-42	COMAL At The Show 4-17
Character Codes 8-61	COMAL Bulletin Boards 5-35
Character ROM 6-37	COMAL Can Compete With BASIC 5-17
Check Cartridge Program Fix 7-72	COMAL Cartridge - A Non-Problem 6-38
Check COMAL Cartridge Program 6-40	COMAL Cartridge Built in Word Processor 5-28
Cheer Up - It Could Be Worse 6-18	COMAL Cartridge Control 6-34
CIE IEEE Interface 3-34	COMAL Cartridge Credibility 6-15
Clarification of Commodore COMAL Versions 1-1	COMAL Cartridge in the SX64 6-36
Clear the Keyboard Buffer 5-47	COMAL Cartridge Input Clarified 6-36
Clock 3-43	COMAL Cartridge is Smart 7-11
Colin's Tips 4-27	COMAL Cartridge Programming Tips 6-6
Color Combinations 2-13	COMAL Cartridge Shadow Letters 6-34
Color Dump Bug 11-37	COMAL Cartridge 3-3
Color Pictures for COMAL 0.14 6-66	COMAL Clinic - Tips and Techniques 10-29
Colors Into Shades of Gray 2-13	COMAL CLinic 11-24
COMAL & BASIC - A Comparison 6-59	COMAL Column - Graphics 6-55
COMAL - An Ideal Language 1-24	COMAL Column - More Graphics 6-56
COMAL 0.14 - Just For Fun 5-22	COMAL Comment 6-40
COMAL 0.14 Error Messages 7-50	COMAL Comments 11-3
COMAL 0.14 Keyword Table, Debug & 5-16	COMAL Communique 7-16
COMAL 0.14 Lower Case Plottext 6-43	COMAL Compatible 3-4
COMAL 0.14 Machine Code Routines 5-26	COMAL Corral 4-4
COMAL 0.14 On Custom Cartridge 3-29	COMAL Disk Notes 1-25
COMAL 0.14 Screen Dump Program 3-40	COMAL From A to Z / TPUG COMAL Guide 6-68
COMAL 0.14 Shortcuts 2-23	COMAL Graphics 1-10
COMAL 2.0 Auto ASCII Conversion 6-40	COMAL HI RES Pictures 6-44
COMAL 2.0 Batch Files 6-52	COMAL Implementations 3-13
COMAL 2.0 Cartridge Memory Map 6-22	COMAL Implementations 5-6
COMAL 2.0 Cartridge Story 5-2	COMAL Implementations 11-10
COMAL 2.0 Disk Editor 7-56	COMAL In School 1-3
COMAL 2.0 Drive Numbers 6-36	COMAL in School 2-24
COMAL 2.0 Error Handler Advantage 6-39	COMAL in school 2-27
COMAL 2.0 External Procedures 7-27	COMAL in Schools 9-8
COMAL 2.0 Fast Directory Read 7-58	COMAL In The News 3-18
COMAL 2.0 From 0.14 6-12	COMAL in the Real World 7-12
COMAL 2.0 Function Keys Note 7-77	COMAL is a nice language 11-56
COMAL 2.0 Gemini Screen Dump 6-37	COMAL is Compatible 6-53
COMAL 2.0 Hints and Tips 6-41	COMAL Is Fast 2-30
COMAL 2.0 Input Field 5-10	COMAL Is Too Fast 1-24
COMAL 2.0 Internal Structure 9-50	COMAL Keypad 6-16
COMAL 2.0 is Compatible With 0.14 6-79	COMAL Language Notes 5-54
COMAL 2.0 Keywords 11-30	COMAL Memory Map Locations and System Notes 3-10

TITLES

COMAL TO Filename

COMAL Memory Map Locations and System Notes 3-10	Direct Reduction Repayment Schedule 8-60
COMAL Monitors 12-48	Direct'con - Link to the IBM PC 9-14
COMAL Night On PLAYNET 9-36	Directories of Disks 6-44
COMAL On the Radio 3-9	Disassembler In COMAL 2.0 7-59
COMAL Programs From Ireland 2-17	Disk Backup Problems 2-27
COMAL Sampler Disk Survival Guide 3-13	Disk Directories for Disk Sleeves 11-40
COMAL SIGNature 4-46	Disk Directory Hardcopy 1-25
COMAL Standard 1-26	Disk Directory Manipulator 3-6
COMAL Standardization Meeting 4-55	Disk Directory Note 1-23
COMAL Standards Conference 7-8	Disk Directory Order 1-23
COMAL Support News 6-46	Disk Editor 5-45
COMAL TODAY Disk #3 Features 3-4	Disk ID Phenomenon 4-55
COMAL Today European Distributor 6-46	Disk Loaded COMAL 0.14 Cartridge 4-16
COMAL TODAY Readers 2-7	Disk Loaded COMAL 1-25
COMAL User Groups 5-64	Disk Talk 4-51
COMAL Version 1.02? 2-30	DISPLAY KEY VALUES 9-22
COMAL Week Long Workshop 7-29	Displayed Codes in COMAL 2.0 9-20
COMALites Unite! 3-19	Distribute the COMAL 0.14 Program 6-42
COMALites Unite! 9-2	Distribution of Disk Library List 6-50
COMALites Unite! 10-2	Dodge 'Em Game 4-38
COMALites Unite! 12-3	Dog Chases Cat 5-32
Comments 9-69	Double Column File Printer 12-12
Commodore 64 COMAL Version 0.14 Memory Map (Preliminary) 3-22	Double Precision Logical Functions 1-20
Commodore C128 Computer 6-5	Draw Molecule 6-32
Compare Commands: 2.0 & 0.14 6-13	Dump Text Screen Pixel By Pixel 4-33
Comparing Disk Files 10-70	Duplicate/Copy MSD Commands 10-26
Compute! Benchmark 5-1	Dutch Error Messages 8-54
Computer Log System in COMAL 2.0 6-72	Dynamic Data Creation 4-17
Comsyb File for COMAL Cartridge 6-38	Easy Curves 10-77
Connect Your C64 to an IBM PC 9-12	Easy Sprites for Beginners 8-12
Control A - Ooops - Bug Fixes 9-7	Educator Needs 11-69
Control Codes With Your Printer 2-28	Eight Queens - A Classical Problem 5-11
Control Key Values 11-14	Eliza For 2.0 And 0.14 7-56
Control P For COMAL 0.14 7-57	Empty Socket-Less Cartridges 5-3
Convert Numbers to Words 10-11	Emulate The STR\$ Function 4-49
Converting Decimal 8-35	EOF Debate Begins 4-51
Converting Sprite Master Files 8-46	Epson FX-80 Printer Codes 6-65
Copy Relative Files / COMAL 2.0 6-37	Epson Screendump Package 10-66
Correction To Disk Editor 7-56	Epson/Cardco+G Procs - Update 9-66
Custom Error Messages 8-66	EPYX Fast Load Cart Works 6-70
Danish Version of COMAL Handbook 4-39	Error Messages Built Into COMAL 4-23
Data Base Manager in COMAL 0.14 6-47	EXEQ - A New Package 10-62
Data File Creator 12-66	Expand COMAL 3-24
De-LINK a Package 11-65	Expand RAM Program Correction 6-70
Define Function Keys Batch Files 6-62	Expert Systems in COMAL 10-16
Delays, Delays, Delays 7-11	Fast DIR Revisited 12-50
DELETE Files Problem 2-28	Fast Directory 2.0 8-68
Depreciation 8-52	Faster RAM Errors System 6-43
Design a Designer Program 10-47	Fastload A COMAL Bitmap Picture 9-46
Detecting The Drive Type 9-36	FFT 11-67
Differential Equations 7-73	File Bug Fix 8-33
Differentiation 11-66	File Name Conventions for COMAL 6-70
DIR in 0.14 10-28	File Names 4-49
	Filename Conventions 10-77

Files Used 7-17	How to Use the META Package 10-65
Fill Keyboard Buffer 6-42	IBM PC COMAL 11-62
Find Command for COMAL 0.14 6-61	Iconmaker 9-27
Find Radicals 7-68	IEEE Printer and CAT 3-35
Find String 4-43	Ignored Again 5-7
Fit It for COMAL 0.14 6-74	Illiterates Unitel 7-6
Fix Disk Errors 11-16	Illusion 8-10
Font Editor 0.14 12-7	Imported COMAL Books 1-23
Font Editor Instructions 10-32	Improved File'Exists Function 6-42
Font Sprite Maker 8-44	Indent A Program Listed To Disk 4-18
FOUNDATIONS IN COMPUTER STUDIES WITH COMAL Reviewed 2-7	Indented Program to Disk 7-78
Foundations In Computer Studies With COMAL 3-41	INDUS GT Fastload 7-26
Founder of COMAL Honored 4-45	Ink Blot 4-53
Fourier Transformation 12-13	INPUT From The Graphics Screen 2-12
Fractals 12-26	Input on Input 7-49
'FREE' COMAL DISKS 9-22	INPUT Statement 1-24
Free Form Data Base 12-40	Instructional Videos 12-24
Freeway 7-52	Integer FOR Loop Is Faster 4-43
Fun Print for 2.0 8-36	Interrupt Input - Easy Restart 5-25
Fun With COMAL 2.0 5-20	Interstellar Dust Clouds 7-48
Function As Parameter 2-32	Inventory Program 5-47
Function Key Definition Limit 7-77	Is 10K Enough? 1-5
Function Keys for MSD Dual 9-32	It's Not The Same Old Song 7-52
Function Keys Revisited 9-33	It's The Little Things That Count 3-7
Function Keys 8-33	Joystick and Paddle Controllers 4-39
Function Keys 9-33	Joystick Control - microSCRIBBLE 1-18
Gemini 10X 'Color' Screendump 9-67	Joystick Cursor 7-77
Gemini 10X Graphics Dump 7-66	Joysticks Paddles 12-67
Gemini SG-10C Printer 7-78	Julian Dates 8-47
German COMAL Group 7-72	Just For Beginners 4-25
Get Into COMAL First 2-30	Just For Beginners 5-8
Getting Started With COMAL 2.0 6-3	Kelly's Beach The Program Listing 12-68
Goodbye GOTO 6-78	Kelly's Beach 12-62
Goof-Proof Programs 8-48	Keyword Print 3-42
Graphic Screen Where Are You 4-41	KWIK Loading COMAL 0.14 7-25
Graphic Screens in COMAL 0.14 6-75	Lack of COMAL Articles 2-9
Graphics Editor System 11-57	Learn COMAL 2.0 with Rod The Roadman 9-58
Graphics Flaw 1-23	Learning COMAL 3-11
GreyMat - Think Into Your C64 11-6	Leave Your Cartridge Plugged In 6-38
Guess It Instructions 5-52	Letter From A Cartridge User 5-15
Gutenberg 4-34	Library Disk/Book Errata 6-63
H-P LaserJet Dump 10-15	License to Sell COMAL 1-23
Handbook Bug 11-37	Light Pen Control - McPen 1-19
Hex and Decimal - Two Conversions 4-39	Light Pen in COMAL 2.0 Offsets 6-38
Higher Prices in 1985 5-3	LINK Program Update 2-10
How Can I Forget Thee? 4-36	Linkup With People/Link 9-57
How COMAL Statements Are Stored 5-12	List On A 1520 Plotter 3-35
How to Draw Anything in COMAL 10-50	List to Disk With Indentation 6-43
How To Dump A Graphics Screen To Your Commodore Printer 4-30	Live Menu 11-5
How To Help COMAL 5-34	Load Bug 6-44
How To Start A COMAL Club 2-22	Load Graphics Screen 3-39
How to Start a COMAL SIG 10-48	Load Machine Code 6-82
How to Use Fonts in COMAL 0.14 10-38	Load Mistake Tip 6-44
	Loading Fonts 7-57

TITLES

Loan TO Real

Loan Payments 12-19
Logical Operators Update 4-18
LOGO Emulator 1-14
Look Back Before It's Too Late 10-8
Lower Case PLOTTEXT in COMAL 0.14 6-54
Lower Case With Your Printer 2-28
Machine Code in COMAL 1-22
Magic 6-7
Mailing List Maker 7-69
Make COMAL Object File 7-61
Make Data Statements From Files 7-60
Make Your Program A Package 9-73
Making Batch Files 7-58
Making Decisions with IF-THEN-ELSE 10-58
Making Stars in 2.0 8-65
Metathink - Thinking About Thinking 10-11
Microvox 4-47
Mindy Mindy Mindy 6-55
Missing Keywords 11-7
M/L Monitor Package for COMAL 2.0 10-74
Modem Fun with COMAL 2.0 9-10
Modify Dump For Gemini 4-33
More Conversions 12-23
More Function Keys 9-33
More on COMAL Substrings 7-46
More on the :+ Bug 6-75
Moving Up to 2.0 6-8
Music To Your Ears - Make Your Own 4-40
Music Write - 0.14 8-30
Narrow Gauge Languages 2-11
NEC 8023 & Prowriter Screen Dumps 4-32
NEC Double Size Graphics Dump 5-64
Netherlands 3-5
New COMAL Booklets Soon 3-3
New Command Messes Up Graphics 6-42
New Package 9-27
New Prices 5-3
New Screendump Package Handles Three Printers 10-72
News and Rumors 3-3
News and Rumours 2-2
No Such Thing As 2.0 Disk For C64 4-18
Notice --- Notice 3-3
Numeric To String 2-7
OBJ'LOAD 3-37
OBJ'SAVE 3-37
Offer Expired 5-3
Okidata 92 Support Plus Chinese Screens 5-18
Okidata Package 12-20
Over 1,000 Programs 5-11
Package Keywords 12-54
Packages 10-11
Paddle Control - Etch-A-Sketch 1-18
Pass An Array As A Parameter 4-48
Pass Command for Drive 9 6-37
Passing an Array as a Parameter 6-39
Pattern Matching Directories 6-35
Perfect Match for the Tutorial Disk 6-45
Perform the Impossible 10-31
PETSCII to ASCII 7-78
Pic Finder 12-32
Pie Chart Maker 3-5
Pinwheel 6-45
Pitfall Harry - COMAL Style 5-44
PLOT'CHAR 3-17
PLOTTEXT - More Variety 4-27
PLOTTEXT Coordinates 2-15
Polar Graphs With COMAL 5-50
Polar Roses 6-41
Polygons - A Program 7-67
Power Supply Notes 12-76
Power Supply Problems 6-35
Pressure Drops and Water Flow 7-71
Prime Numbers 4-45
PRINT FILE and WRITE FILE - the Difference 2-8
Print Large Letters 7-26
PRINT USING Peculiarity 2-28
PRINT'DIRECTORY Limitation 2-28
Printer and COMAL 6-49
Printer Buffer 2-28
Printer Notes / Select Disk File 5-36
Printer Problem? 2-28
PRINTing - Comma Or Semi-colon 4-50
Professional Graphs 5-40
Program to Control 8023P Printer Options 2-29
Programmers Alarm System 5-38
Programming Batch Files - 2.0 8-50
Programming Languages For Beginners and the Global Challenge 1-8
PROMAL Preview 5-37
Protect Programs in COMAL 2.0 6-38
Protected Disk Write 2-11
Protection Program Unbroken 7-74
Protector 4-17
QLink Simulator 12-29
Questions and Answers 10-6
Questions and Answers 11-72
Questions 11-38
Quick Test 12-39
Quote Mode Control Characters 6-49
Rabbit 2.0 12-5
Ralfs COMAL Corner 12-30
RANDOM File Sampler 10-9
Random File Size Finder 10-42
Random Files Bug Revisited 7-17
Random Files Bug 2-4
Random Forest 8-26
Ready, Aim, Draw 10-43
Real Help for Real Beginners 10-40

Recursion 2-14
 Recursion 8-41
 Redefine Function Keys 7-21
 Reiteration 8-40
 Relative File Bug Fix 6-38
 Remember What's His Name 8-22
 Repeating Keys 6-43
 Restore Key Disable 7-78
 Restore to Label in COMAL 0.14 6-71
 Review: Beginning COMAL 2-27
 Review: Beginning COMAL 3-36
 Review: Captain COMAL Gets Organized 2-12
 Review: Captain COMAL Gets Organized 3-36
 Review: COMAL HANDBOOK 2-9
 Review: COMAL Handbook 2-30
 Review: Structured Programming With COMAL 2-23
 Roads To Rome 12-21
 Round - User Defined Function 6-44
 RTC MULTI-LINK 3-29
 Rumors and News 1-1
 Save Graphics Screen 3-38
 Savescreen Correction 5-37
 School Orders - How To Do It 3-15
 Screen Dumps 4-47
 Scroll Down 4-50
 See Program Name Table 5-46
 Setpage 6-62
 Setrecorddelay 6-39
 Several Benchmarks 12-38
 Several Files Open At Once 6-42
 Shape Data Statement Maker 8-45
 Shape Files 0.14 8-21
 Sharing 7-18
 Shifted Space and Shifted Return 6-39
 Show Stopper - CAT Pauser 5-31
 Show The COMAL 2.0 Name Table 9-68
 Show Your Turtle 5-33
 Sideways 12-10
 Sieve Benchmark 5-1
 Sign Language 5-33
 Signals From SID 5-42
 Sizzle - COMAL 0.14 Fastload 9-43
 Solve Those Rounding Errors 9-32
 Some Very Nice Graphics 4-39
 Song Editor for COMAL 2.0 6-68
 Sorting It Out 10-18
 Sound Effects 12-61
 Sound Routines for 0.14 8-34
 Sounds from Holland 8-35
 Space Required Around COMAL Words 6-63
 Spanish COMAL 5-3
 Special CHR\$ Results 7-78
 Special CHR\$ Values 4-37
 Special COMAL Cartridge Section 6-35
 Speedscript Fix 9-46
 Speedscript SEQ Converter 8-56
 Spirolateral 4-35
 Sprite Locations in COMAL Cart 6-41
 Sprites and COMAL 1-15
 Stack Overflow 2-15
 Standardization 3-3
 Stars 4-48
 Statistics 11-37
 STR\$ and VAL Routines 2-6
 STR\$ in any Number Base 5-43
 Strings In COMAL 5-23
 Substrings - Easy 6-73
 Symbolic Differentiation 9-53
 Tanks & The Animate Keyword 9-64
 Target Game - A Start 5-31
 Teaching COMAL in a Classroom 2-25
 Tech Sketch Light Pen 7-78
 Telephone Number Database 10-45
 Testing Logic Circuits 5-39
 Text Package 11-63
 The ' In A Name 2-12
 The Chips In The Cartridge 7-55
 The COMAL Column - Recursion 3-15
 The COMAL Column - The Reply! 3-20
 The Joy of Trap 9-24
 The Missing Comma 5-12
 The Missing Letters Game 10-46
 The Old Time COMAList 1-20
 The Problem Of Inertia 3-30
 The Quality COMAL Image 3-3
 The Quick Change Sprite 9-30
 The Real Julian Day 9-76
 The Truth About Computers 8-9
 TODAY Disk #5 - Lots of Programs 5-30
 TODAY Disk Confusion 3-4
 Top 5 Best Selling COMAL Books 9-23
 Topical Table of Contents for BEGINNING COMAL 4-44
 TPUG COMAL Disk 2-5
 Trace Those Bugs With Trace 9-26
 Transfer 0.14 Programs To 2.0 12-42
 Transposition 8-39
 Turbo 64 and COMAL 0.14 6-43
 TURBODISK COMAL Loader 7-25
 Turn Off Error Messages 2-30
 Tutorial Disk Strikes Back 5-49
 Two Column Directory 6-43
 Two Drive Copier 4-18
 Type in Old English 11-5
 Typesetting Test 2-11
 Unit to Unit File Copier 10-71
 Untouched Memory On Boot Up 4-18
 USCUG Endorsed and USCUG Approved 3-20
 USE Meta to Evaluate Expressions 10-64

TITLES

Use TO You're

Use of Names in COMAL 8-24
Useful Procedures 8-43
User Group Disk #10 9-48
User Group Disks 4-12
User Groups - Updated List 4-15
Using A Two Sided Disk 9-28
Using COMAL HANDBOOK with C64 COMAL 1-2
Using Strings in COMAL 9-70
Using the Interrupt Command - 2.0 8-62
VAL and STR\$ 0.14 12-25
VALGOL: for Non-Programmers 10-76
VECPAC, MATPAC, ROTPAC, PLEXPAC 2-16
Viewport and the Screen Dump 6-27
'Walker' - Sprites on the March 10-44
Wall Clock 4-29
Wandering 4-39
Warning - Cartridge Users 7-74
Welcome, COMAL Pioneer 1-1
What Does COMAL Stand For? 4-17
What is the COMAL Starter Kit 6-44
What The Heck is COMAL? Read This!! 2-10
What's New? - COMAL News! 4-7
Where Have All the GOTO's Gone 6-64
Word Game for 2.0 8-69
Your RUN/POP Key 11-18
You're Looking Good! 5-24

Appendix

It would be nice to just drop twelve issues of *COMAL Today* into a computer and have an index emerge at the printer. In fact, there are programs which will automatically produce an index. Unfortunately, such programs are limited in a number of ways:

- 1) The text to be indexed must be in machine readable form.
- 2) The text should be written with the index program in mind.
- 3) Automatic indexing programs work best with highly technical material covering a single area of interest, such as chemistry or medicine.

Even without all these limitations, auto-indexing programs can only be considered a starting point for producing an index. In creating the *COMAL Today* index, it happens that all three limitations work against the use of auto indexing, especially the fact that I did not have the original text files on disk. *[Actually, the files are scattered on dozens of disks and not with the page numbers needed for indexing.]*

Of course, a computer was still useful in creating this index. In fact, I ended up writing a number of different programs to help with the indexing. Before getting to the actual program descriptions, however, let's review the basic steps needed to produce an index:

- 1) Compile the data (keywords and phrases, authors, titles, and their issue-page number cites).
- 2) Sort the data in a meaningful way.

3) Print the sorted data.

4) Edit the sorted data, making any necessary corrections, deletions, and additions (also note useful cross references).

5) Sort the edited data again.

6) Print the resulting index.

In practice, I found it necessary to go through steps 4, 5, and 6 three times to produce the final index.

For each of the basic steps listed, I wrote one or more programs. These programs, written in COMAL 2.0, were the result:

idx.enterdata
idx.parse/split
idx.sort
idx.sort-all
idx.sort/cite
idx.x-reference
idx.print
idx.edit
idx.count

The programs are listed in the logical order in which they are used. With the overall picture established, let's look at each of the programs in detail.

IDX.ENTERDATA

What the program does:

This program simplifies the process of typing in the index entries. You first enter the volume number and starting page number for the data entry session. As each page to be indexed is read, the appropriate information is entered under

the title, author, or keyword area (see FEATURES for more instructions). When **<return>** is pressed, the program automatically appends a cite (volume and page number) to the entry. The page number can be incremented (function key F3) or decremented (function key F4) as required.

Function keys:

Other features:

Editing features:

<home> : homes the cursor

<shift> <clr/home>: deletes current line

<ctrl> I: insert mode; all characters typed are inserted at the current cursor location (hit **<ctrl> I** again to turn off insert mode)

<ctrl> P: phrase mode; the cursor stops blinking and you can now use the cursor keys to highlight a phrase (hit **<return>** to *capture* the phrase)

<ctrl> C: copy a *captured* phrase to the current cursor position

<ctrl> K: erase line from current cursor location to end of line

note: *<shift>* = shift key
<ctrl> = control key

How the program works:

All entries are accumulated in internal program buffers; when the program is ended (or a buffer is full) the entries are appended to their respective *authors*, *titles*, or *keywords* sequential files. Note that the program will not create these files if they do not already exist. Therefore, before using this program for the first time, you must create all three files. For example, to create the *authors* file, simply give the commands:

```
select output "0:authors"
select output "ds:"
```

This will create an empty sequential file called *authors* to which data can now be appended.

IDX.PARSE/SPLIT

What the program does:

Keyword entries are parsed to produce multiple entries from a single entry; the resulting data are sent to one of six keyword data files:

[illegible]

keywords.a-b

keywords.c-d

keywords.e-g

keywords.h-n

keywords.o-r

keywords.s-z

It is necessary to break the keyword entries into six separate files in order to have data files of manageable size.

How the program works:

The effect of parsing is to take an entry such as:

integer storage in WRITE files

and from it create multiple entries:

**storage in WRITE files, integer
in WRITE files, integer storage
WRITE files, integer storage in
files, integer storage in WRITE**

Notice that the second entry (beginning with *in*) is not particularly useful. The program therefore eliminates entries beginning with common words like a, an, the, of, and so on. The parsing process thus automatically generates cross reference entries; for each original key phrase entered, an average of one or two additional entries is generated. Since keyword entries are the largest part of the index, this can dramatically reduce the amount of typing required.

Unfortunately, in spite of the automatic deletion feature, some nonsense entries will still be created by the parsing process. These can easily be deleted during the proofreading/ editing process, however, so they represent only a minor inconvenience. Some of the entries generated lie on the borderline of

usefulness; I usually leave these in because some people might find them helpful, and others can easily ignore them.

A final note: Like the data entering program, the six sequential files used by this program will not be created for you if they do not already exist. Before you first use the program, you must create the six keyword files. Refer to the discussion under *IDX.ENTERDATA* for a simple method for creating these files.

IDX.SORT

What the program does:

This is an external file sorting program. The user specifies both the file to be sorted, and the file to be created (a sorted copy of the original file will be created). A sequential text file too large to fit into computer memory is sorted into dictionary order. Upper and lower case records will sort in proper alphabetical order. Numbers are treated as text, so entries may not always sort in numerical order. For example, page 10 will sort ahead of page 3, but after page 03.

How it works:

The entire sequential file to be sorted is read to determine the size of the largest record; this information is used to optimize the the size of arrays used by the program.

Next, a portion of the data file is read into memory, sorted into dictionary order, and then written back to disk as a temporary *subfile*. This process repeats until the entire file has been read and rewritten to disk as sorted subfiles. The sorted subfiles are then merged back

together, two at a time, to produce a final sorted file.

WARNINGS:

This program makes intensive use of the 1541 disk drive. Large files may require several minutes to over an hour to sort; most of that time will be spent reading from and writing to the disk drive. If a drive error is encountered during this process, the program may crash, resulting in corrupted files. It is therefore highly recommended that you make a copy of the file to be sorted, and sort the copy.

Finally, you must leave space on the floppy disk for the temporary subfiles. In other words, if the file to be sorted is 50 blocks long, you must have at least 50 free blocks on the disk.

IDX.SORT-ALL

What the program does:

This is a utility program to sort the six keyword files in unattended mode. It is identical in function to *IDX.SORT*, except that file names do not have to be entered.

How the program works:

A disk containing the six keyword files is placed in the disk drive. When the program is run, each of the six files is sorted automatically, without further operator intervention. When used with the datafiles for this index, the sorting process takes several hours.

WARNING:

The original six keyword files on the disk are erased by this program, and replaced

with sorted copies. If for any reason you need a copy of the original unsorted keyword files, be sure to make copies before running this program.

IDX.SORT/CITE

What the program does:

A sequential text file containing reference citations is sorted into dictionary order. Text entries which are identical except for the cites will sort in proper numerical order by cite number. In all other respects this program is identical to *idx.sort*.

How it works:

Reference cites are appended to all text records as a volume and page number delimited (marked) by an @ character. For example, a cite to *files* in volume 3, page 42 would appear as *files@3-42*. With the @ delimiter as a guide, the program can separate the text part of a record from the cite part of the record; when the text parts of two records are identical, the cites are then compared to determine proper numerical order. This program was written specifically for sorting the *authors* file, so that multiple cites for an author would appear in proper order.

WARNINGS:

All of the warnings under *idx.sort* are applicable to this program.

IDX.X-REFERENCE

What the program does:

A list of synonyms or related topics are entered. The list is sorted into dictionary order, and converted into a set

four cross references will be produced:

files: see also device, directory, disk drive

How the program works:

QUIT: quit the program; any cross references in the buffer will first be saved to disk.

When running this program, you should have the disk containing the six keyword files in the drive. Unfortunately, appending the entries to the files is rather slow because the drive must read through the

entire file to append a record (it is not possible to keep all six files open at one time on the 1541 disk drive). Once all the cross references have been added, you must then sort the files again to put them in proper order.

What the program does:

Features:

5) **Gutter margin:** this is the number of spaces on the right hand side of a left hand page, or the left hand side of a right hand page (the *gutter* is the split between two pages in printer's slang).

text before the index proper, and still maintain proper numbering.

Default values are given for all choices; you may select the defaults to simplify printing, or change them to your own preferences.

While printing, the program displays on the monitor the file and page number currently being printed.

How the program works:

The program is quite straight-forward. The six program files and the author and title files are read in proper order. As each record is read in, it is *wrapped* if necessary to fit the column or page space available. The first and last entry for each page is noted, in order to create a dictionary style header (header 2). Each page is first *printed* internally in an array the size of a full page; when the internal *page* is full, it is numbered and sent to the printer.

WARNING:

The program requires that you have a data disk containing all six *keyword* files, the *authors* file, and the *titles* file in the disk drive.

IDX.EDIT

What the program does:

Sequential data files too large to fit into available memory can be edited with this program. Records are read from a *data file* into a program buffer where they may be altered or deleted. You may also insert additional records into the file. The edited and inserted records are then written to an *edit file*. The original data

[illegible]

file is not altered.

Features:

Available commands:

GET <N>: get (read) N records from the data file; if the edit buffer is full, records will be written from the buffer to the edit file to make room.

INSERT: insert a record into the buffer at the current buffer-pointer position; one record will be written to the edit file to make room for the inserted record.

SORT: sort the buffer contents only; this is a simple sort which does not ignore upper/lower case.

EDIT: edit the record at the current
buffer-pointer location.

GOTO <N>: move the buffer-pointer to record number N.

FIND "<text>": search the buffer only for the word or phrase in <text>.

QUIT: write any remaining records in the edit buffer or data file to the edit file, print edit statistics to the screen, and end the program.

Keyboard features:

<ctrl> K: delete from the current cursor position to end of line.

<ctrl> L: move cursor to last character in the line.

<shift> <clr>: erase entire line.

<clr/home>: home cursor to beginning of line.

<cmdr> P: set phrase toggle (the cursor stops blinking, a phrase is marked using the left/right cursor keys; hit **<cmdr> P** again to capture the phrase).

<cmdr> C: copy phrase (a captured phrase is copied to the current cursor position)

Note: **<ctrl>** = control key
<shift> = shift key
<cmdr> = Commodore key.

Function keys:

F1 = delete toggle. The record displayed will be marked for deletion; if the record is already marked (by DEL in reverse characters) it will be unmarked (and therefore not deleted).

F5 = move buffer pointer one number higher in the buffer.

**F6 = move buffer pointer 10 numbers higher
in the buffer.**

F7 = move buffer pointer one number lower in the buffer.

F8 = move buffer pointer 10 numbers lower
in the buffer.

The record pointed to by the buffer pointer is always displayed on the screen. The position of the record in the buffer is shown both graphically and numerically on the screen; the record number (in terms of records read from the data file) is also displayed on the screen.

[illegible]

Status messages:

Buffer full: indicates that all available buffer space (40 records) is in use.

End of file: the end of the data file has been encountered, there are no more records to be read into the buffer.

File not found: a data file was specified which is not on the disk currently in the disk drive.

Illegal command: a command was entered which the program does not understand.

Insert: shown at the bottom of the screen to indicate insert mode is active; all text typed in will be inserted at the current cursor position.

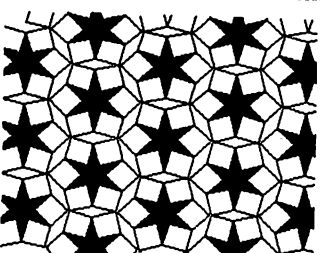
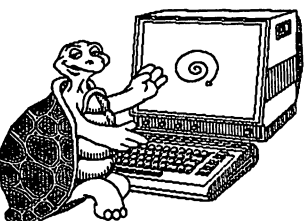
Phrase: *phrase capture mode* is active; use the left/right cursor keys to mark a phrase in reverse text.


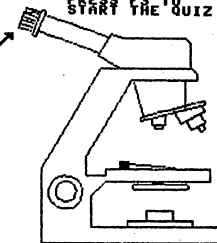
String not found: when using the FIND command, no matching string was found in the records in the buffer.

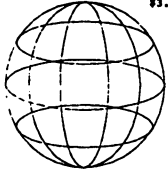
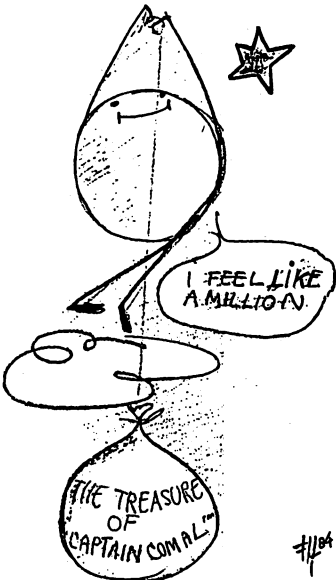
At the end of an editing session, the program will display *edit statistics* on the monitor, which tally the total number of records read from the *data file*, the number of records deleted and inserted, and the total number of records in the *edit file*.


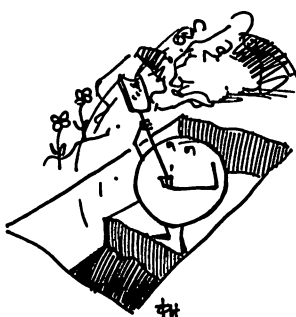
IDX.COUNT

This program was written simply to satisfy my own curiosity. It simply reads through the six *keyword* files and the *authors* and *titles* files, and counts the total number of entries in each category.

<p>IBM PC COMAL 2.0 ANNOUNCED BY IBM DENMARK</p>  <p>CELEBRATING COMALS 10TH ANNIVERSARY</p>	<p>COMAL <small>83-95</small></p> <p>5</p> <p>TODAY</p>
<p>I SPEAK</p>  <p>COMAL</p>	<p>EXPAND COMAL 0.14 TO 11,838 BYTES FREE</p> <p>COMAL IMPLEMENTATIONS JUST FOR BEGINNERS</p> <p>OKIDATA 92 SUPPORT PLUS CHINESE SCREENS</p> <p>COMAL 0.14 SET OF MACHINE CODE ROUTINES</p> <p>SHOW STOPPER - CAT PAUSER</p> <p>SIGN LANGUAGE</p> <p>SPANISH COMAL</p> <p>COMAL BULLETIN BOARDS</p> <p>PROGRAMMERS ALARM SYSTEM</p> <p>DISK EDITOR</p> <p>POLAR GRAPHS WITH COMAL</p> <p>COMAL 2.0 LIGHT PEN USE</p> <p>PROGRAMS ON 28 COMAL DISKS COMPLETE DIRECTORIES LISTED OVER 1,000 COMAL PROGRAMS</p>

<p>HE FORGOT TO SAVE...</p>  <p>CAPTAIN COMAL™</p>	<p>COMAL Today</p> <p>6</p>
<p>COMPARING COMAL 2.0 & 0.14</p> <p>COMAL CARTRIDGE MEMORY MAP</p> <p>COMAL 0.14 MEMORY MAP</p> <p>SHADOW LETTERS FOR COMAL 2.0</p> <p>COMAL SUPPORT NEWS</p> <p>COMAL 0.14 DATA BASES</p> <p>COMAL 0.14 TOKENS</p> <p>COMAL: CARTRIDGE PROGRAMMING TIPS</p> <p>BATCH FILES</p> <p>EXPAND COMAL 0.14 TO 11,838 BYTES FREE REVISITED</p> <p>FUNCTION KEYS</p> <p>COMAL 0.14 FIND COMMAND</p>	<p>MICROSCOPY QUIZ</p> <p>PRESS F1 TO GO ON TO NEXT PART</p> <p>PRESS F2 TO QUIT</p>  <p>NAME: OCULAR</p> <p>This program is on TODAY DISK #6</p>

<p>COMAL 7</p> <p>TODAY</p>	<p><small>83-95</small></p>  <p>SPHERE PLOT</p>
 <p>THE TREASURE OF CAPTAIN COMAL™</p>	<p>COMAL FOR NON-GURUS</p> <p>FAST LOAD COMAL 0.14</p> <p>BOOK REVIEWS</p> <p>DEFINE FUNCTION KEYS</p> <p>2.0 EXTERNAL PROCEDURES</p> <p>BATCH FILES</p> <p>INTERSTELLAR DUST CLOUDS</p> <p>COMAL DISASSEMBLER</p> <p>DISK EDITOR</p> <p>1520 PLOTTER DRIVER</p> <p>FAST DIRECTORY READER</p> <p>MAILING LIST MAKER</p> <p>GEMINI 10X GRAPHICS DUMP</p>

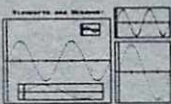
<p>COMAL 8</p> <p>TODAY</p>	<p><small>83-95</small></p>  <p>RANDOM FOREST - page 26</p>
	<p>WORD GAME</p> <p>DIRECTORY EDITOR</p> <p>RANDOM FOREST</p> <p>EASY SPRITES</p> <p>SHAPE MAKER</p> <p>CUSTOM ERROR MESSAGE</p> <p>MUSIC WRITER</p> <p>SOUNDEX</p> <p>INTERRUPT COMMAND</p> <p>FUN PRINTING</p>

COMAL TODAY
COMAL USERS GROUP U.S.A., LIMITED
6041 Monrovia Drive, Madison, WI 53716

IF YOUR LABEL SAYS
LAST ISSUE I
YOU MUST ORDER NOW.
USE CARD INDEX.

80% BUILT
U.S. PARTS
FABRICATED
IN U.S.A.

COMAL TODAY 9

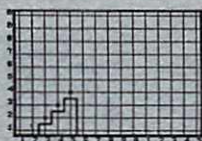


From program "VIEWPORT" on COMAL TODAY Disk #9



COMAL
USERS GROUP
USA

DCN



Learn COMAL 2.0 With Rod the Roadman
An Article and program by
Borge Christensen

- SIZZLE - FASTLOADER page 43
- PACKAGE MAKER page 73
- ICON MAKER page 27
- COMAL 2.0 TOKENS page 64
- MODEM FUN page 10
- 1525 SCREEN DUMP page 78
- FUNCTION KEYS page 33
- ANIMATE SPRITES page 64
- USING STRINGS page 70
- JOY OF TRAP page 22
- BITMAPS page 38

COMAL TODAY
COMAL USERS GROUP, U.S.A., LIMITED
5041 MONROE DRIVE, MADISON, WI 53718

WEEKLY RATE
U.S. POSTAGE
PAID
PERMIT NO. 101
MADISON, WI

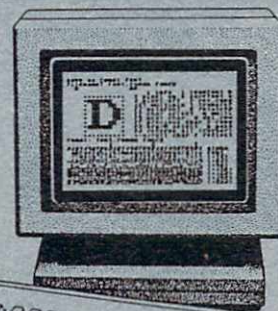
IF YOUR LABEL SAYS
LAST ISSUE: 9
YOU HAVE REACHED THE
USA CARD INSIDE

COMAL TODAY 10



See Program on Page 78

The
Font
Editor



ALSO —
New Packages
Ready-To-Type Programs
Sorting Techniques

COMPACT
BITMAPS
page 68

HOW TO DRAW
page 50

SCREENDUMP
PACKAGE
page 72

SORTS IN COMAL
page 18

EXPERT
SYSTEMS
page 16

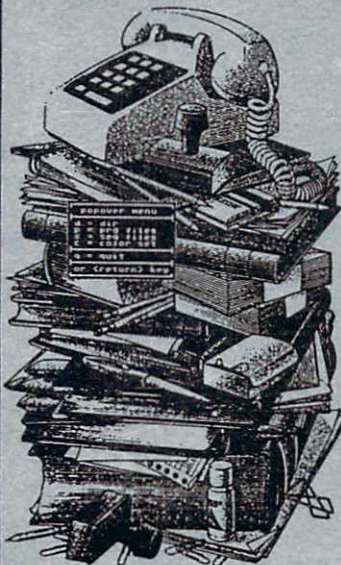
COMAL CLINIC
page 29

FONTS
page 30

COMAL TODAY 11



DISK DIRECTORIES - 3,000 PROGRAMS



SPECIAL REFERENCE ISSUE

GRAPHICS
EDITOR
SYSTEM
page 87

POP OVER
MENUS
page 18

80 COLUMN
OUTPUT ON
THE C128
page 38

COMAL 2.0
KEYWORDS
CHART
page 30

RAM DISK
page 63

DISK SLEEVE
DIRECTORIES
page 60

PACKAGE
DE-LINK
PROGRAM
page 65

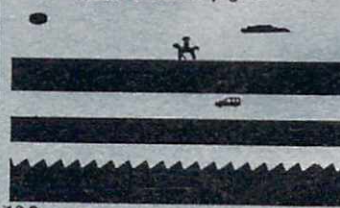
OKIDATA
GRAPHICS
DUMP
page 66

COMAL TODAY 12

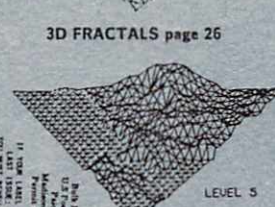
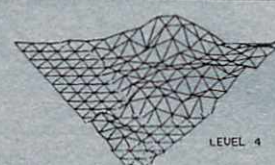


BENCHMARKS

KELLY'S BEACH page 62



3D FRACTALS page 26



THE ENHANCER
page 4

RABBIT 2.0
page 3

FREE FORM
DATA BASE
page 40

PIC FINDER
page 22

FONT EDITOR 0.14
page 7

SCHEMATICS
inside covers

PACKAGE
KEYWORDS
page 64

SIDEWAYS
page 10

DOUBLE COLUMN
FILE PRINTER
page 13

FAST DIR
page 50

1571 NOTES
page 77

TRANSFER
0.14 TO 2.0
page 41

AUTOEXEC
page 42

COMAL TODAY
5041 Monroe Drive
Madison, WI 53718

IF YOUR LABEL SAYS
LAST ISSUE: 12
YOU HAVE REACHED THE
USA CARD INSIDE